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Skyways

FOR BUSINESS

OFFICIAL PUBLICATION NATIONAL BUSINESS AIRCRAFT ASSOCIATION

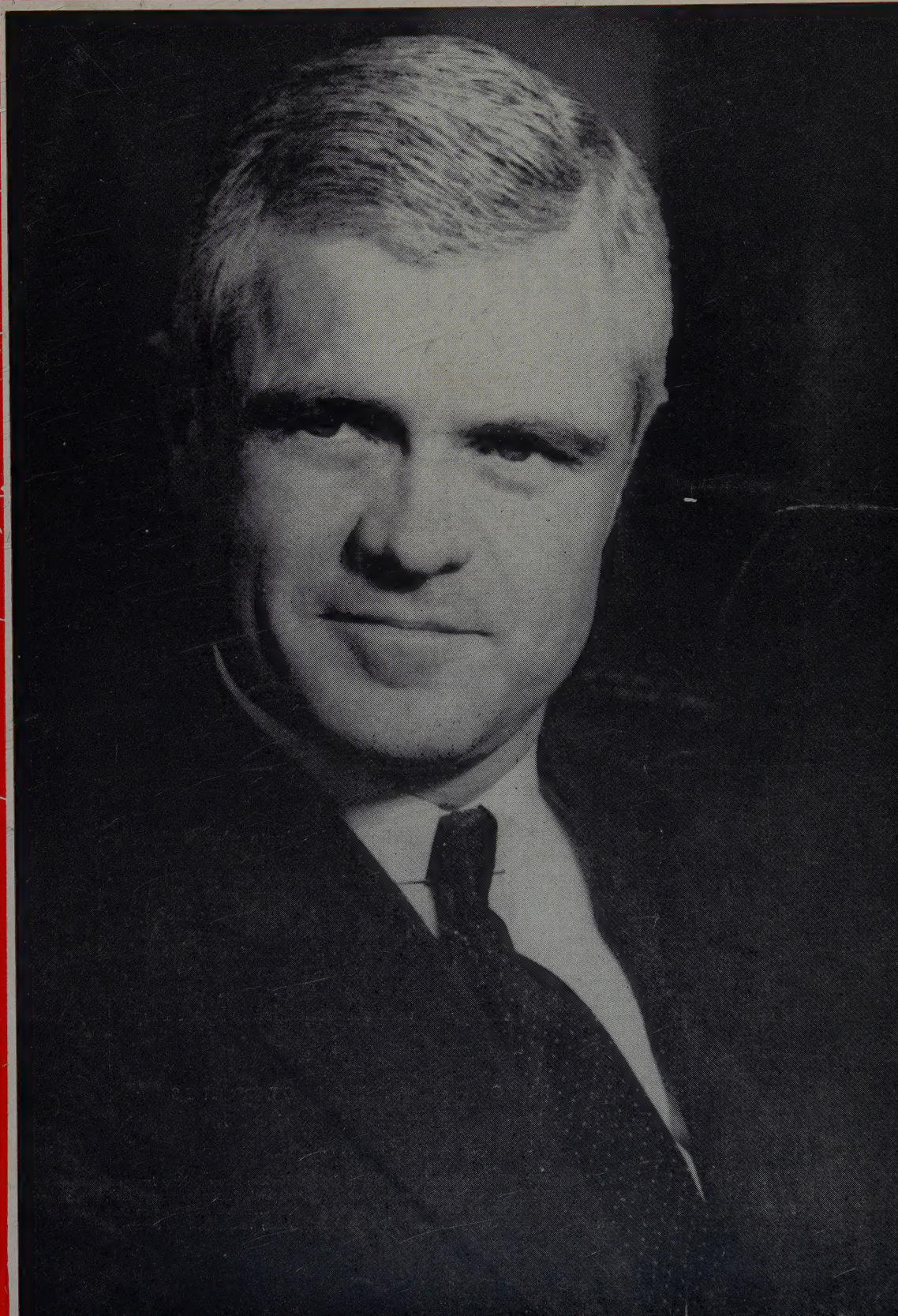


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Aeronautics

High
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FEBRUARY 1957

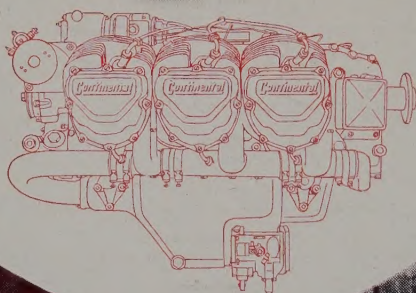


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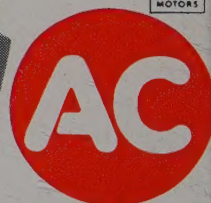
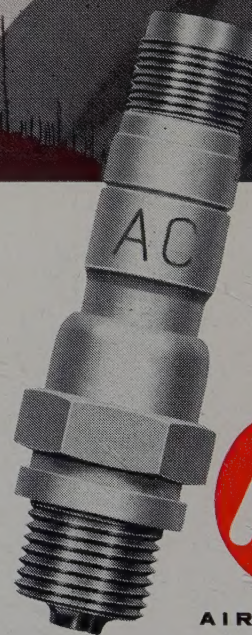
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Skyways FOR BUSINESS

FEBRUARY, 1957

The official publication of the National Business Aircraft Association

COVER: James T. Pyle, newly appointed Administrator of Civil Aeronautics, is a veteran of 25 years in aviation. A pilot before he completed college, Mr. Pyle started his career with Pan American World Airways. He was Assistant to the Vice President when he left in 1946 to become President of the Air Charter Company and later President of the Denver Air Terminal Corp. As Special Assistant to the Asst. Secretary of Navy for Air, he worked closely with the CAA. In 1956 he joined CAA as Deputy Administrator for Charles J. Lowen, and became Acting Administrator September 5, 1956.

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FOUNDED BY J. FRED HENRY, 1942

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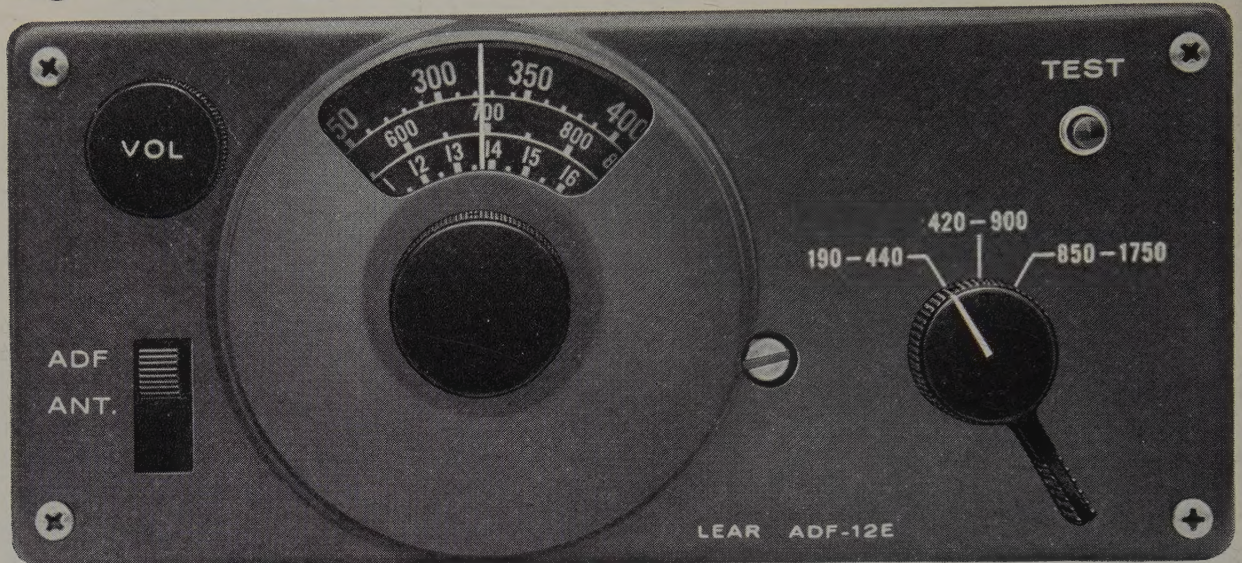


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FRONT of the new Lear ADF-12E

Lightest in weight • Easiest to operate • Less than half the cost



BACK of the new Lear ADF-12E —

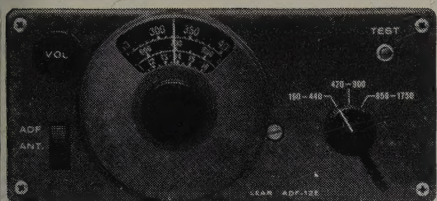
10,000,000 hours of flying time logged by Lear ADF's



DATA

ON THE NEW LEAR

ADF-12E



Lear's ADF-12E is a phenomenally lightweight, compact, and inexpensive combination ADF system for executive planes—both single engine and “twins.”

It combines:

1. A radio range and communications receiver.
2. A broadcast receiver.
3. An automatic direction finder—on range, beacon, and broadcast stations.
4. Power and modulation provisions to “drive” a Lear 12-channel VHF transmitter for standby or general use.

Powered for both loudspeaker and headphone operation, with *continuous tuning* on the three bands 190 to 440 kc; 420 to 900 kc; and 850 to 1750 kc.

10,000,000 logged flight hours behind Lear ADF design and manufacture assure the ADF-12E of even greater accuracy, smoother response, improved sensitivity, and unmatched reliability.

ADF-12E TUNER—Particularly designed for ease of operation. Featuring a sloping full reading dial, an operational press-to-test button for making indicator-swing test, and continuous tuning through its three bands.

AMPLIFIER—Compact, powerful, single-package unit designed for remote mounting. Contains power supply, amplification, and automatic control functions. Connects electrically, no flex shafting. 12 or 24 volt systems.

ADF LOOP—Lear's revolutionary Ferro-Dynamic® Loop is electrically driven, small, compact, and light in weight. Hermetically sealed with electrical error corrector for greater accuracy.

AZIMUTH INDICATOR—Connects electrically—no flex shaft—thus, simplified installation.

POWER OUTPUT: 3 watts max.; 1.2 watts undistorted.
POWER USE: Max. 3.3 amps. at 28 v.; 5.7 amps. at 14 v.
WEIGHT: Tuner, amplifier, loop, indicator—total 17.3 lbs.
TUNER DIMENSIONS: Lgth 8 3/8"; width 6 3/8"; hght 2 7/8".

DUAL INSTALLATIONS of the Lear ADF-12E (for “running fixes,” IFR use, maximum all-weather safety, etc.) weigh less and cost less than average single ADF installations.

For complete details see your nearest Lear dealer or write directly to LearCal Division, 3171 South Bundy Drive, Santa Monica, California.

LEAR

now hear this . . .

PERSONNEL

William T. Schwendler, Senior Vice President and a founder of Grumman Aircraft Corp., was elected to N.Y. University Board of Trustees.

Charles E. Miller has been named head of Engineering Services at the Pacific Div., Bendix Aviation Corp. **John P. Anderson** is new Project Engineer in charge of hydraulic servo valve engineering group; **William H. Chester** and **Charles W. Thomas** were appointed Assistant Supervisors of Telemetry Section, Bendix Pacific. **Leo E. Gatzek** is new Supervisor of Heat Treating Dept., in addition to present position as head of Bendix Pacific Metallurgical Lab.

Dewitt C. Ramsey (Admiral, USN Ret) was elected Vice Chairman of Board of Governors, and **Orval R. Cook** (General, USAF Ret.) President of AIA. **Malcolm P. Ferguson**, Bendix Pres., was elected Chairman of the Board until June 30; **Whitley C. Collins**, Northrop President, will be CB from July 1 to Dec. 31.

Raymond A. Rich has been elected President, Director, and Member of Executive Committee of Avco Mfg. Corp.

Fred Benninger, former General Mgr. and Secy. Treasurer of Flying Tiger Line, named Executive Vice President & Secretary.

Donald M. McGrath was named San Diego Plant Mgr. of Solar Aircraft Co.; prior, he was General Manager, Utica Div., Bendix.

Henry F. Dever, Pres. of Brown Instruments Div., Minn.-Honeywell, now directs M-H activities in industrial controls.

Harvey Gaylord, General Mgr., Texas Div. of Bell Aircraft, is now President of the newly created Helicopter Corp.

Joseph H. Moore has announced the formation of Moore Development Co., aircraft components; prior he was head of Experimental Dept., Pastushin Aviation.

Robert B. Ward was appointed Advertising and Sales Prom. Mgr. of Atlantic Aviation Service, Inc., Beech-Piper Dist.

Lee S. Johnson was elected General Manager of Sikorsky Aircraft Div., United.

John Rane is director of engineering and sales, **George Ray** is Chief Engineer, **Stan Smith** is Chief Project Engineer and **John Weisbeck** is contracts engineer at the new Aircraft Div. of Bell. New appointments in Bell's Research Div.: **John F. Hawkins**, Administrative manager; **Robert E. Hannel**, Services Manager; **William Schultz**, Sales Manager, **Ronald E. Shainin**, Contract Administration Manager.

Clarence N. Sayen was re-elected President of ALPA at the 14th Convention. **G. M. LeRoux** is new First Vice President; **R. L. Tuxbury** is new Secretary; **D. J. Smith** was re-elected Treasurer.

Raymond H. Heller now heads the Sales Department of Robertshaw-Fulton Controls Aeronautical Div.

Mundy I. Peale, President of Republic Aviation, is new President of I.A.S. New Vice Presidents: **E. E. Aldrin**, Av. Consultant to Standard-Thomson Corp.; **L. C. Craigie** (Lt. Gen., USAF, Ret) Engrg. V-P of Hydro-Aire; **R. E. Marquardt**, Pres.,

Marquardt Aircraft; **E. D. Osborn**, C-B, Edo Corp. **P. R. Bassett**, Consultant to Sperry-Rand, is Treasurer.

Henry Blankenheim is new production and factory manager of Piasecki's Delaware Div., formerly Bellanca Aircraft Corp.

Ralph Lehman is new Manager, Aircraft Equipment Sales, F.T.T. Div. of I.T.&T.

Benjamin W. Chidlaw (Gen., USAF, Ret) is new Chairman of Planning Committee, Thompson Products.

Harrison W. Holzapfel was named Assistant Manager of Garrett's AiResearch Av. Service Div.

Chandler C. Ross, Manager of Liquid Engine Div., Aerojet-General Corp., received the R. H. Goddard Memorial Award at the 1956 annual meeting of American Rocket Soc.

Charles Schuck, previously stationed in Tulsa, has joined CAA's maintenance group in Washington on a project to determine uniform maintenance standards.

Don Gammon has been named System Chief Agent for Riddle Airlines; **Milton Zohn** is Riddle's new Claims Mgr.

H. T. Deitrich is in charge of the newly-established Washington office of Kaman Aircraft Corp.

William G. O'Callaghan was appointed General Superintendent of Production of Allison's Aeroproducts Operations.

Howard M. McCoy (Col., USAF Ret.) has been appointed Washington representative of Curtiss-Wright Corp. Prop. Div.

Archie N. Colby has been appointed General Sales Mgr. of Green Hydraulics.

Andreas J. Darlson has been appointed District Manager by Nickel Cadmium Battery Corp., Easthampton, Mass.

France Q. Wilson was named Manager of Turbine and Control Sales, Solar Aircraft.

William Blinoff has been named Midwestern Sales Engineer for Semiconductor Products Div. of Motorola, Inc., Chicago. **Dr. Ben R. Gossick** has joined Motorola as Chief Engineer in Charge of Circuitry Dept. of the same division.

Lloyd Prunty, former Chief of Quality Control for Steward-Davis, Inc., Gardena, Cal., has become the company's Eastern Representative. **Oscar W. Anderson** is S-D's new Chief of Quality Control. **Joseph E. Yates** replaces Mr. Anderson as Chief Inspector.

Frank H. Miller has been elected Assistant Treasurer of Curtiss-Wright Corp., Wood Ridge, N. J.

J. Robert Carter has been appointed Administrative Assistant to John Paul Riddle, President of Riddle Airlines, Miami.

William E. Rohman has been named to the newly created post of Manager, Operations Accounting Service, Hamilton Standard Div. of United Aircraft, Windsor Locks, Conn.

D. N. Taylor has been elected to the Board of Directors of Pastushin Aviation Corp., Los Angeles, and was appointed Secretary-Treasurer.

Everett W. Thompson has been appointed Supervisor of Turbo-prop contracts of Allison Div., G.M.

(Continued on page 39)

Editorial

IT'S DENVER IN OCTOBER

NBAA's Board of Directors has chosen "Denver in the Rockies" for the 1957 Annual Forum. Henry Boggess and Bill Lawton met with the Denver Committee early in December on preliminary arrangements. Hotel rooms, suites and exhibit space are all sewed up. The local Committee is already organized and planning is under way. Dallas and Detroit and Miami may have been good, but Ken Skinner of Jepperson says Denver will be better.

Washington for the East, St. Louis and Dallas for the Midwest, Detroit for the North and Miami for the deep Southeast have been the scenes of the past five NBAA Forums. Each location was chosen for two reasons: to serve the members of an area and to utilize the services of strong local committees. The choice of Denver for 1957 will not break precedent. The Rocky Mountain area and the West Coast are due a Forum; the business flying "gang" at Denver are a hot bunch—they have their own Rocky Mountain Business Aircraft Association, which has been doing quite well, thank you, for several years.

Denver promises to be an ideal setting for an Annual Forum for more reasons than one. There are approximately one hundred and forty airplanes used in business that are based at Stapleton Airport; there is scenic beauty galore; hotels are excellent and the buffalo and elk steaks Louis Labe talks about should be worth the trip. Harry Combs says that the Denver Forum will make the oldtimers quit talking about Dallas. Better plan part of that '57 vacation now, and tell the Boss that about a week in October in Denver is a must.

★ ★ ★ ★ ★

A NATIONAL CIVIL AIR SHOW?

The military and the aircraft industry have all but officially said that the National Aircraft Show has just about served its purpose and is destined to fold and pass away.

If the National Aircraft Show becomes a memory, that memory will long remain a fond one. Since the early twenties "the Show" has played an important role in promoting airpower and in keeping the public aware of the many advances that have been made in the field of aeronautics. If any mistake has been made, it has been in gradually permitting "the Show" to become a military spectacle with civil aviation hardly recognized even on the fringes.

Through concentrated national publicity a yearly air show should serve to focus the public mind on the positive and the affirmative in aviation. Instead of abandoning a national air show, there should be a lot more focussing of the public mind on the true values of aviation. Remember, there are said to be approximately ninety million Americans who have never been aloft in an airplane.

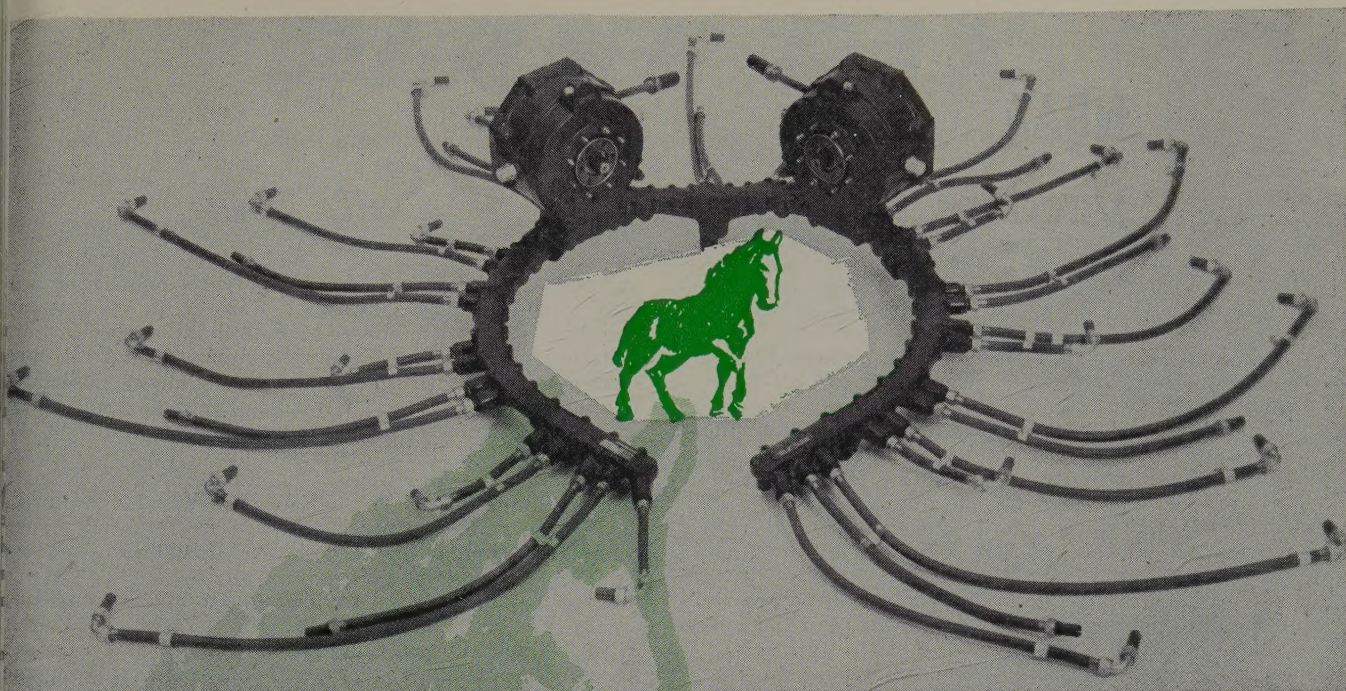
Everyone in aviation, and millions not directly connected with it who have learned to lick "time" and "distance" while conserving energy and increasing productiveness, already know that the air ocean will be the real highway of tomorrow. The other ninety million seem to need a bit of convincing which only the civil segment of aviation can do. It would be major contribution to once and for all firmly establish the *safety* of flight in the public mind. Perhaps the concentrated publicity that could come from a National Air Show can turn this trick. Flying, being approximately five times safer than automobile travel, should have an inestimable public appeal, if only the facts can overcome the scare headlines of every isolated air accident.

The military and that segment of the airways industry that serves it may have concluded that THE National Air Show has about served its purpose, but there are other people in aviation who may not be so sure. Perhaps the very fact that the National Aircraft Show has year after year become more and more military and less and less civilian has had something to do with the diminishing public interest. Mr. Jones of Main Street doesn't ever hope to ride in a military jet anyway.

It might take a year or two and quite a bit of effort to arrange a National Civil Air Show, but the result should be a real shot in the arm for civil aviation. Imagine Flying Farmers, Ninety-Niners, Flying Doctors, Business Aircraft, the airlines, the private pilots—from the "fly in for breakfast" group to "soaring clubs" and the boys with the hand-built jobs—all gathered together to show their wares and interchange their know-how! Races? Why not? Prizes for the oldest flyers, scholarships for the youngest, trophies for precision demonstration and so on. Think such a national show wouldn't help to awaken those ninety million land-locked brothers and sisters from 16 to 90 that flying is living? Nickels to donuts it would.

SKYWAYS stands ready to help promote the idea. Anybody for a National Civil Air Show? The line forms wherever Uncle Sam has a mail box to speed your opinion our way.

Wonder what progressive American city will be first to say, "We'll back a National Civil Air Show for 1959?"



Reliable **harnessed horsepower**

Aircraft ignition has always been known as a delicate and sensitive system. All components require specific tests and attention to meet the demands of today's high altitude and varying atmospheric conditions.

Rigid specifications are followed by factory trained technicians who also subject the components and system as a whole to all known performance tests to provide efficient and reliable service.

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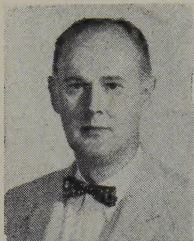
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NBAA Director's Notes

Suite 344

Preliminary CAB report on Phillips Petroleum Lodestar accident near Bartlesville, Okla., indicates failure of left engine rear master rod bearing.

Gross weight, CAB preliminary report says, was 19,770. Flight enroute from Bartlesville, home base, to Salt Lake City with crew and 6 passengers. Pilot called company radio operator 14 minutes after take-off reporting high oil temperature. Pilot then cancelled IFR clearance and elected to pro- ture left engine. Pilot then cancelled IFR clearance and elected to proceed VFR to Tulsa, 38 miles away.

Five minutes later ship crashed. Left engine was feathered. CAB report says. Weather: 6000-ft. ceiling, visibility 10 mi

* * * * *

NBAA Washington staff is now participating in experimental runway lighting systems evaluation at Andrews AFB, Md.

Three systems to be judged on four criteria:

1. Effectiveness in completing approach,
2. Usefulness during touchdown,
3. Steering guidance provided after wheels are on ground,
4. Benefits during climb-out on missed approach.

Lighting systems designed to put illumination directly on runway to eliminate "black hole" caused by rapid transition from high-intensity approach lighting.

* * * * *

Instrument ratings are under examination by CAA. Present regulations said to be too loose for close administration, allowing pilots with "book time" or no recent experience to fly IFR.

CAA proposal may include annual flight check to prove proficiency. Problem, again, will be in administration with some 32,000 instrument ratings now in effect, which are not now subject to periodic checks.

* * * * *

Tax for airway users? Possible legislation for this Congress would require all airways users to pay mileage tax for flying on Federal airways. Revenues would help pay for navigation aids, including Vortac, which the Military "forced" down Civilian throats, radio facilities, airports. Revenue system now in use in Peru, where government operates airways system jointly with CORPAC (private corporation).

* * * * *

Watch for *Steel* Magazine's examination into the why's and wherefore's that influence management's thinking on entering into business flying field. Wash. ed. J. Morrissey of *Steel* and others are contacting NBAA members for background material, case histories.

* * * * *

April is target month for Curtis report to White House. The most important study of U.S. civil and military aviation's needs for next 10 to 20 years will over-shadow all other reports. Comprehensive report will forecast U.S. program for aviation. NBAA is taking active part in General Aviation Facilities Planning Group which gave Mr. Curtis facts and figures which will determine needs for airports, navigation systems, radio, etc.

900 airports, 100,000 flight operations were covered in two-day survey of civil aviation. These figures, plus other business flying statistics and forecasts, will help to determine future civil aviation policies.

* * * * *

122.8-123.0 mc special service frequencies, NBAA sponsored, should be approved by FCC this month, 122.8 at airports without control towers, 123.0 at airport with control towers. Station operator applicants should withhold requests for licenses until FCC makes public decision. No applications will be processed until then. NBAA headquarters will inform members when FCC announces frequencies ready.

(Continued on page 43)

The December Board Meeting of your Association was held at 344 Pennsylvania Bldg., Washington, on Monday, Dec. 17. As usual, your Board had a full day's agenda.

Present at the December meeting: Joseph B. Burns, representing The Fuller Brush Co., and NBAA's newly appointed Executive Vice President; Gerard J. Eger, representing International Harvester Co., NBAA Treasurer; Henry W. Boggess, Sinclair Refining Co.; Ralph E. Piper, Monsanto Chemical Co.; James Ketner, Jr., newly appointed Board Member, representing Texas Eastern Transmission Corp.; Tom R. Neyland, representing E. Cockrell, Jr., and reporting on the formation of a South West Regional Committee for NBAA.

Sorry that these board members were unable to attend: Curt G. Talbot, General Electric Co.; Walter C. Pague, ARMCO Steel Corp.; Cole H. Morrow, J. I. Case Co.; Robert C. Sprague, Jr., Sprague Electric Co., and Eugene T. Spetnagle, Wolfe Industries (Aviation).

Following the meeting, NBAA's Executive Director and Assistant, and Lois Henry, Editor and Publisher of SKYWAYS, the official publication of NBAA, attended the Wright Day Dinner.

On behalf of the membership, 344 Penna. Bldg. welcomed the new members accepted by the board: Aviation Insurance Agcy., Atlanta, Ga., as an Associate Member; Air Transport Section, General Motors Corp., Detroit, Mich.; Utex Exploration Co., Inc., Moab, Utah; S. D. Warren Co., Boston, Mass.; Ware Knitters, Ware, Mass.—as Regular Members.

Torch Lewis, Thatcher Glass Mfg. Co., Elmira, N.Y., advised that he was speaking before the International Discussion Group, Elmira, in the early part of January on "Business Flying." Frankly, Torch, we can't think of a better subject.

Torch also advised us that he is in need of a co-pilot.

Everett Dyer, Chief Pilot, and Earl Bates, Co-Pilot, Republic Steel Corp., Cleveland, O., visited NBAA headquarters recently.

Don't forget the Jet Know-How Symposium at Wright Air Force Base, Dayton, Ohio, on Feb. 7-8, 1957.

Dec. meetings attended by your Executive Director and/or Assistant, Dick Groux: General Aviation Facilities Planning Group; Special Meeting in New York with Board Members; Air Space Panel; Tall Tower Meetings; Designers of the U.S. Air Force to finalize the Jet Know-How Symposium; Swearing-in of new CAA Administrator James T. Pyle; Special Meeting with Arrangement Committee for NBAA's 10th Annual Meeting and Forum in Denver, Col.

Mailings for Dec.: Announcement of NBAA's 10th Annual Meeting; notice of Jet Know-How Symposium; enclosing the proposed agenda, registration form and hotel confirmation card; forms for your Alphabetical and Numerical Listings for your Directory of Business Aircraft.

A copy of NBAA By-Laws will be forthcoming in the very near future.

Notice to NBAA members: please keep 344 Penna. Bldg. advised of any changes in personnel, aircraft make and registration, etc., so that your Directory and mailing listings, for NBAA and SKYWAYS, may be kept up-to-date.

Notice to NBAA members: How many new members were you responsible for in the past year?

Address all correspondence relative to membership requirements and Association business to National Business Aircraft Association, 344 Pennsylvania Bldg., Washington 4, D.C., or give us a call at NAtional 8-0804.

"C.M."

PLANE FAX

by STANDARD OIL COMPANY OF CALIFORNIA



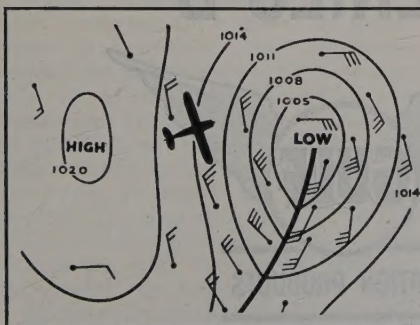
Taking glacier "portraits" at 10,000 feet

Skimming over the Cascades far above timberline, photographer Hugh Ackroyd and pilot John Inman flew into every ice-clogged canyon from Mount Rainier south to the Three Sisters. Often skirting within 50 feet of the jagged surface, they completed a photographic survey of the range's shrinking glaciers in one day.

A veteran pilot himself, Mr. Ackroyd says "I can fly from Portland to any job anywhere in hours, and I often do. Sometimes it calls for flying as rugged as our glacier trip,

but Chevron Aviation Gasoline always gives me the extra push I need whenever I need it. Chevron never fouls plugs, either — keeps the engine running smoothly under the toughest flying conditions."

Back at his home airport of Hillsboro, near Portland, John Inman says "I'm an A & E, and I've seen RPM Aviation Oil end my trouble with sticking valves and rings. When I open up an engine I can tell if it's been run on 'RPM' — it keeps parts so clean it almost doubles engine life."



TIP OF THE MONTH

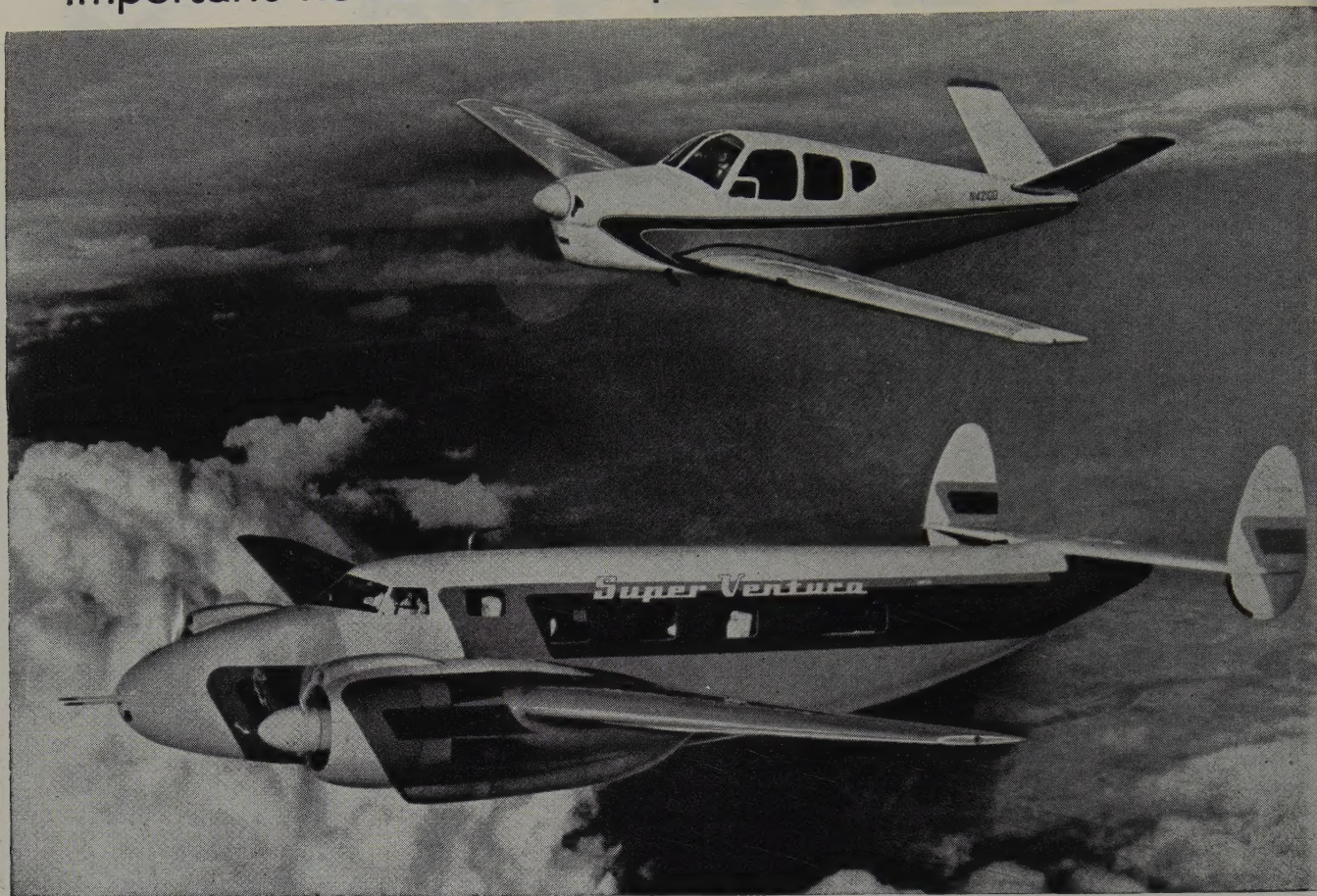
It's wise to remember that your altimeter will read more altitude than you actually have when you fly from a high to a low pressure area, and when you head into colder air.

We take better care of your plane



T.M.'S "RPM," "CHEVRON," "PLANE FAX," REG. U.S. PAT. OFF.

Important news for all corporate and private flyers...



Super Ventura and Beechcraft Bonanza

A new development for **all** types of aircraft engines

Here's a new detergent-type oil for all types of aircraft engines—whether they're horizontally opposed, inline or radial! It keeps all kinds of aircraft engines cleaner than was ever possible before with non-detergent oils . . . *without* developing any undesirable side effects.

The secret? New Gulfpride Aviation Series D combines Gulf's exclusive Alchlor Refining with a remarkable new "detergent additive."

Cleaner engines

Experience in all kinds of service proves New Series D greatly *reduces carbon, coke and varnish collection* around rings and valve stems. *Eliminates harmful deposits* in the combustion chambers.

More hours between overhauls

New Series D offers you an unusually tough lubrication film, too. *Cuts down wear on engine parts substantially.* The result? Far lower operating and maintenance costs! Safer engine performance! Why not try it and see for yourself?

New **GULFPRIDE AVIATION SERIES D**





DC-3 Panel

Substituted in this issue for the regular Round Table

Chairman: Ralph E. Piper, Monsanto Chemical Co. Members of the Panel: Steve Doss, Emhart Mfg. Co.; Wilford Dotter, International Harvester Co.; Art Kuhn, Pan American Airways; Owen Mayfield, Hercules Powder Co.; M. L. Nicholson, Mine Safety Appliance Co.; J. J. O'Brien, AiResearch Div. of Garrett Corp.; Richard Rigg, Owens-Illinois Glass Co.

Ralph E. Piper (Chairman): "I would like to welcome all of you to the DC-3 panel. The gentlemen on the platform do not present themselves as experts on the DC-3, but each of them has some knowledge on one particular topic, and we are hoping that most of the comments will come from the floor.

"Someone asked me the other day how we accounted for the fact that so many NBAA representatives were pilots. I think probably the answer to that is that the administrators or the traffic people are sitting behind a desk, and the pilots are necessarily out every day. They are travelling all over the United States; they are coming up with ideas, and there is a lot of hangar talk in New York, Washington, Pittsburgh and Philadelphia. At any center of business aircraft activity you can hear all kinds of hangar talk; that was one of the main reasons that prompted us to come up with this type of program.

"Now, is there anyone who has a pet gripe that he wants to discuss?"

Talbot: "This isn't a gripe, but it is something that is in all our minds, and I would like to start the ball rolling.

"AiResearch is coming out with a maximizer kit which they guarantee for a twenty mph increase, and several of the engine people are doing the same thing, which gives a forty mph increase the way I count. Say that you are indicating 155 mph; now, that is 195, and I believe the smooth air cruising is 185. What I am interested in is structure; is anyone doing anything about that?"

Piper: "Mr. Kuhn, perhaps you can comment on that. These people have done a lot of DC-3 work for us."

Kuhn: "Concerning the DC-3, we have contacted CAA from the standpoint of increasing both the gross weight and the true speed of the plane. The DC-3, as you well know, was certificated before the days of Part 4-B of the CAA and CAB regulations. The CAA emphatically announced to us that, were we able to get the Douglas Aircraft Co., and Douglas only, to run a new stress analysis on the aircraft in accordance with the present O4B requirements, that they would then be in a position to consider any comments from Douglas and permit both a gross

weight and airspeed increase, but unless we were able to accomplish this, we would be stuck with the present limitations, which are based on a stress analysis performed under entirely different criteria. CAA insists that Douglas perform the stress analysis in accordance with their requirements because they do not feel that any servicing facility or engineering organization is capable of doing it. Douglas advised us that their effort was spent on the Super DC-3, which has not gone over, and as a result all of their manpower is now being spent on more modern jet aircraft. They have no further plans for the standard DC-3. If you wish to use the maximum gross weight of 26,900 pounds, then you must also adhere to the 183 mph maximum indicated airspeed.

"The aircraft was certificated under 4B when they put the R-2000 engine out. Now, this aircraft in its present configuration can never be certificated under a 4B flight characteristics because of the wing and tail construction. We are all operating under a sort of waiver in that respect, and will continue to do so as long as we operate this plane with the present wing and tail."

Piper: "Is there any further explanation about the wing and tail construction that you can elaborate on?"

Kuhn: "As you gentlemen know, the DC-3 was designed and flight tested before the advent of the current 4B regulations, which have very definite rules respecting yaw, roll, pitching moment and flight performance. The requirement for stall techniques, for instance, is very stringent, and rules this aircraft completely out of the category characteristics configuration. That is the one that requires aircraft to coast along, and not pitch before it will roll. Those of you who have practiced stalls in the DC-3 know that it will roll on its back as you apply power with the nose above the horizon. That is one of the features of this aircraft that can never be made to meet the T category unless you adopt the modifications used on the Super DC-3, which included a completely new wing and tail.

"However this aircraft has been successfully operated for the last twenty

years. Those of us flying it certainly are aware of those characteristics and safeguard ourselves by becoming thoroughly acquainted with them and avoiding the situations. It was on this basis that CAA gave the DC-3 a new lease on life: because of the safety of operations over this period of years."

Owen Mayfield: "Mr. Kuhn, since your company puts out a set of very fine wheelwell doors which has contributed greatly to improving performance, I wonder if I might ask you to clarify this limitation on speed as far as true indicated airspeed is concerned. One hundred eighty three mph is the true indicated air speed at the 26,900 gross configuration, is it not?"

Kuhn: "The 183 mph limit does apply to the maximum gross weight. If the weight is reduced in accordance with the spec. at 26,900, then the indicated airspeed can be increased. When you get down to about 22,000, the indicated airspeed can be increased approximately as high as 210 mph.

"As I recall, these are arbitrary limits established by the CAA on the basis of some experience with this aircraft. They are not the results of calculated gust load limits as currently applied to aircraft in accordance with O4B requirements. It is my personal opinion that there is plenty of safety within those limits."

Piper: "Thank you, Art. Are there any other questions from the floor?"

Webster: "In 1954 there was a meeting in Washington, when they picked a figure out of the air to put the DC-3 back in business on an exception basis at 26,200. The airline pilots kicked about it, so they said, 'Well, how about taking another thousand pounds off it?' That's how you got your 25,200."

Piper: "Is there anyone here from the CAA certification section?"

Buril Barclay (CAA): "That was based on performance rather than on construction.

Conrad: "This has nothing to do with certificated aircraft, but most of you fellows flew these airplanes all through the war at 30,000 pounds. The Canadian government was also flying certificated aircraft at 26,900."

Piper: "Thank you, Bill. I think

there are very few here who haven't flown them overweight. My personal viewpoint on the gross weight of the DC-3 is this: I know you can fly them at 30,000 pounds; but on a hot day, overloaded, no wind, short field, and maybe you lose an engine—then you know why you don't want to fly them much over 269.

"I believe Owen Mayfield has a comment."

Mayfield: "The statement I want to make has to do with maximum speeds and rough air. Under those conditions, it has been a comfort to me to know that the Douglas publication which I read some time ago said that the DC-3 will stall at an indicated airspeed of 130 mph before the wing will permanently distort. At 140 the wing will stall before it will reach its ultimate strength. In other words, you cannot tear the wing off above 130 mph, and below 130 you can't even damage it; your airplane will stall first."

Piper: "I think those figures are substantiated by an Air Force publication, on all-weather flying: if you do not exceed 140, and try to keep it above 120 for control, you need not worry about pulling the wings off because that doesn't happen within those brackets."

Wilford Dotter: "As I recall the question that lead to this discussion concerned hyper kits and maximizer kits. I think we have in the DC-3 an airplane that will, if we do a little work on it, perhaps do 220 miles per hour. I would like to see someone make an effort to reach the maximum indicated airspeed on a DC-3."

Member of the Audience: "Isn't it true, Mr. Kuhn, that the airlines still have a higher operating speed than we do, and is it because of the weight bracket? If you certificate the airplane for 26,200, are you assuming the penalty for operating at 26,900?"

Piper: "This gentleman here would like to answer that."

Albrecht (Sylvania Electric): "We just finished doing test improvement, and we found that when you start out with 25,200, if it is an old DC-3 and you have no operation manual, you are simply going by operational limitations, and your never-exceed speed is 257 mph. If you operate at 26,200 your maximum drops to 211 mph."

Kuhn: "Perhaps I can clarify that a little. There are two systems under which the airplanes are being operated. The first system is one in which the plane is considered to be operating under the transport category. The airlines are most interested in that configuration. It permits them to operate at a somewhat higher airspeed provided it is within transport category. When we operate under these requirements, we must operate with a flight manual aboard, which makes it necessary to apply runway-length requirements, temperatures, etc., so that in certain fields we are penalized greatly as compared with what you must be, when operating not in accordance with the transport category and in accordance with the flight manual."

Member of the Audience: "I know

of no domestic airlines operating the DC-3 on transport category."

Kuhn: "I was thinking of Panagra, a U.S. licensed airline operating in accordance with transport category requirements in and around South America. In order to do so, it is necessary to apply the penalties to the aircraft that you people are not concerned with."

Hinkman (Chrysler): "I would like to have an explanation on limitations expressed in the manual on altitude, load and airspeed, particularly under SR207, and what it really refers to."

Conrad: "The way your manual reads right now, you comply only with the limitation section; the performance is not concerned in any way. That is what the new regulation says, the one drawn up a year ago, but which has not been passed yet, to compel operation under 4A or 4B to abide by the performance section, which would make you take into account the temperature and altitude. Right now, you only have to comply with the limitation on power, settings and indicated airspeeds."

Jim Magnus: "Are we being a little foolhardy in ignoring that section?"

Conrad: "Of course, safety is our program, and we feel that you fellows have done a wonderful job. We feel that SRO7 was one of the best things that ever happened, as it gave you something on paper to show what the airplane would do."

"I think you all handle your operations very well; you know your people and the limitations of your aircraft. It is in the manual; if you want to use it, fine. If you feel that you have a safe operation by going up with a few extra pounds aboard, that is a decision you have to make. The data are in the book so you can calculate the risk and take your own position."

Guild Ford: "I am still at odds with Mr. Conrad's explanation, and I toss this in for whatever it is worth. SR407 states that the aircraft on a performance basis, with certain engines and so on, shall be operated in accordance with performance requirements of 4A and 4B specifically states in the take-off path and in the climb performance, there are certain climb requirements that have to be met, and they are 1.3 VSO squared and so forth."

"It was the intent of the regulation to limit the gross weight of the aircraft with altitude in accordance with 4B transport category requirements; it was not intended to force the airplane to operate in accordance with runway-length requirements as an air carrier. If you can get it off at 2000 feet, fine; but if you want to load it at 26,900 and try it, that is your problem."

Conrad: "The fact remains that if any of you were over-grossed and anything happened, you are not in violation by not complying with your performance section. However, when the regulation is changed, then you will be."

"The question has been asked: 'Is it legal or isn't it? Do you have to comply with the performance regulations?' I think you should, but the answer to your question is that, right now, you are not in violation."

Kuhn: "As further clarification, I think we might point out the reason for the existence of 407. You recall that for years the DC-3 was operated with the standard engines at standard speeds and weights. Then CAA and CAB gave it a new lease on life, and SR389 came out. That permitted the engines from the 1830-92's, the 1830-94's, and the 1830-75's and some of the Wright engines. When the R2000 engine was brought into the picture the regulation advanced to SR407, and the reason for 389 and 487 was to make it mandatory, so far as certificated operations were concerned, to apply the transport category to this airplane, and those modifications were made."

"The CAA did not wish to continue the use of the DC-3 in the configuration we had been accustomed to operate. Applying the same known safety margins to the higher gross weights and the higher powers they felt that if we were going to increase the weights and increase the power, that we should then be forced to operate the airplane in accordance with transport category."

Piper: "Are there any more questions before we discuss Jato?"

Gilbert DeVore (DeVore Engineering): "I have been working with airplanes on the subject of Jato and Jato installations. We have been working hand in glove with CAA and CAB in getting regulations and policy to make Jato feasible economically."

"We have an interim policy from CAA because they realize the safe features of Jato and have decided to go along with the corporation in establishing certain credits for aircraft equipment with Jato, but they are going to be low credits. The weight with which compliance is shown with take-off climb requirements of CAR41 or 4A or 4B, whichever is applicable, plus the weight of Jato bottles and their installation but not to exceed 200 pounds per Jato bottle and the increased take-off weight, the airplane shall comply with all other applicable requirements."

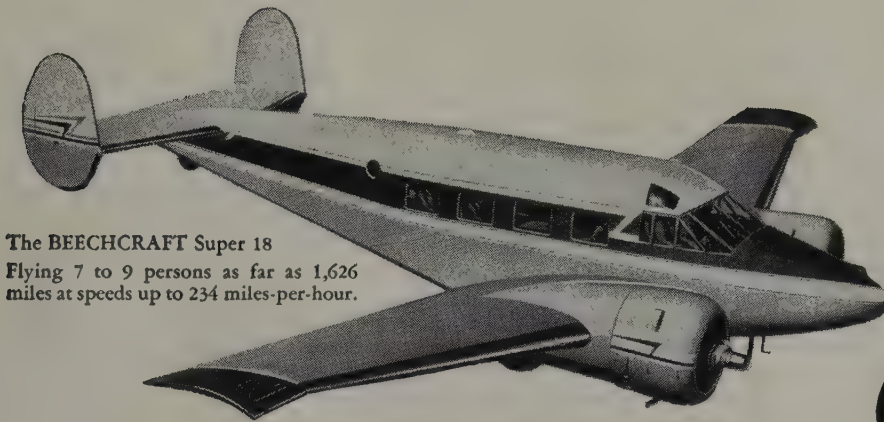
"In terms of the DC-3, unless it is an air carrier operation, there is not much reason to go through the effort required to reduce take-off distance because you are not bound to operate in accordance with take-off distances. However, it might be well to know what can be done with Jato: at 6000 feet a DC-3, operating at 26,900, will reach 300 feet above the airport with failure of one engine at V_1 . It will reach the height of 300 feet sooner in a shorter distance than a 25,200 airplane without Jato. Now that the interim policy has been worked out, if you have a 262 airplane, for example, you can fly it with two Jato bottles, weighing about 350 pounds, and you could fly it at 26,550."

"For the DC-3 there is available an external Jato installation and we have just completed an internal installation."

Piper: "I would like to call on Mr. O'Brien, of AirResearch."

J. J. O'Brien: "On the subject of economy and performance as related to airspeed, any further improvement in the DC-3 would be welcome, though we are not able to increase the top

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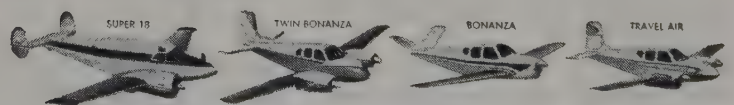
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speed beyond the present limit. But even if you cannot exceed the speed limit, you are going to get a reduction in horsepower which will reduce operating costs in general.

"We have very little hope for an increase in the top limits already prescribed for the airplane. This is entirely in the hands of the Douglas company. We have talked to them and they don't give us much to hope for."

Piper: "Mr. Barclay is here from the CAA and recently has been associating himself with some of the characteristics of the DC-3 flightwise and some of the things they have probably done in Oklahoma City, which you fellows have not necessarily tried out. Buril, you have the floor now, to give us some of the details of the performances of the DC-3."

Barclay: "First, I might mention this special regulation 407 which the CAB made primarily to permit raising the gross weight. Someone mentioned before, part of the manual must be complied with and part of it does not require compliance under the current regulations. Actually, the Board, in writing regulations on transport categories, has always been in the habit of adding the words 'when used in air transport service.' So you don't actually have to comply with the performance limitations unless you are operating in air transport passenger service.

"However, don't be lulled into a false sense of security just because you don't have to comply with them, because we have been cooking up a course down at the Center for our inspectors who have a lot of business flying in their areas. This course is partially an engineering flight testing course and is frequently referred to as the single-engine DC-3 course. However, we found a few reasons why the DC-3 wouldn't meet all of the 4B requirements.

"Such things as pulling it up to a fairly slow speed at cruise power and trimming it for about 105, getting it stabilized there, and then starting to feed in left rudder keeping the wings level with opposite aileron. At a certain point, the rudder goes over the limit by itself and stays there.

"Well, what does that prove? Actually, not too much, except that straight 4B certification does not permit a rudder reversal. It doesn't hurt the performance of the airplane, however, except in spin recovery. During this experimenting we practiced oscillation stalls. With climb power, we would take the thing right up to a complete stall, bring the wheel all the way back, and hold it to the bottom and back up to the horizon. This maneuver demonstrates the effectiveness of the ailerons, if you're quick. However, if you aren't quick you are on your way in a spin.

"If it spins, it goes for a turn and a half before you get any pressure at all on any of the control surfaces. During the turn and a half, a good bit of altitude is lost.

"The first time we started with about 6000 feet and came out with about 1200. It really goes downhill.

"On normal stalls with a standard

DC-3 you get a little aileron nibble that you can feel just before the break. We have one experimental airplane at Oklahoma City that has experimental wing tip lights on it. They are installed in what resembles tip tanks about four or five feet long. These little tanks on the wing tips just ruin that nibble or indication that you normally get just ahead of the break. The inspector, or trainee in this particular case, pulled it up to a stall altitude. In this particular instance, the trainee just wasn't paying enough attention and without warning the aircraft stalled, the wing went down, and there was a real good unintentional spin. When you have the warning aileron nibble, you know it's time to get to work. It takes full aileron, but when you anticipate, and use full aileron, you can ride through an oscillation with no problem.

"We have established a new business flying specialists course at Oklahoma City, specifically for the inspectors who have a heavy concentration of business flying in their areas.

"We are trying to do a lot of things in a three-week period, including brushing up their instrument proficiency and refreshing them on airplane performance and emergencies. It takes a periodic refresher to keep our men sharp enough to get maximum performance out of the heavier aircraft, since a good bit of their flying is in lighter aircraft. We are acquainting them with all the airplane flight manuals that are available on the market so they can help the operators interpret the charts and also point out how the airplane must be flown to obtain the performance indicated on the charts.

"In ground school, we are covering performance of all multi-engine aircraft, but we are limited on funds, so our flying is done in DC-3's and Twin Beeches. The experimental DC-3 I mentioned has ballast tanks installed so we can pump water back and forth to exceed the forward and rearward CG limits. Stalls under such configurations can produce some interesting results. It emphasizes the desirability of staying within the CG limits when loading the aircraft.

"This airplane also has thrust meters, a yaw meter, control pressure gauges and a dozen other gadgets used by the engineering division in conducting performance tests. Accordingly, it was a good airplane for us to check engine-out performance at a gross weight of 262. A feathered propeller has a little drag, but by making use of the yaw meter and thrust meters, we could set up our engine out trim more accurately and with minimum drag without feathering the propeller. Therefore, the performance we obtained should have been somewhat better than that attainable without the thrust and yaw meters and with a propeller feathered. The aircraft has dash 92 engines installed. One has about 650 hours on it and the other has between 700 and 750. The elevation of Oklahoma City Airport is 1,300 feet, temperature was 60°, wind SE 5 knots, altimeter 30.00."

Member of the Audience: "What

kind of props were used on the CAA plane?"

Barclay: "Paddles. As you well know, V_1 and V_2 are the same on the Dougs, and that is 92 miles or 80 knots indicated. Now, with our 26,200 pound load as with any other load, we pulled off at 80 knots. As soon as it was definitely airborne we called for 'gear up.' The copilot, or in this case, the instructor, pulled up the gear and immediately pulled back the left throttle. We dropped the right wing about 5° and pulled the nose up to an attitude that would maintain 80 knots. By the way, this is an attitude that should be learned. It is an attitude that gets you the most altitude at the least expense with either one or two engines running. With one engine out, you have the best angle of climb. With two running, you continue to pick up speed. I might add that speed is of little or no advantage when you lose an engine during or shortly after takeoff, whereas, altitude is 'money in the bank.' Any excess speed quickly dissipates when you lose an engine, leaving you in a poor position to get around the field, particularly under unfavorable conditions, but if you have some altitude, you can afford a limited drift down rate while you're getting around the field.

"But to get back to the takeoff, we called for feathering the left one and the instructor gave us zero thrust power on the left engine."

Member of the Audience: "What kind of power provided zero thrust?"

Barclay: "About 10 inches; actually 9 on the left and 11 on the right.

"We went out of the field in pretty good shape up to about 125 feet. At that time, we had run out of our two minutes for takeoff power and had to come back on the good engine to METO power. At that point, we quit climbing and sat right on the top of the ground cushion for about ten miles. When we would hit a little ripple in the air, we would lose about 25 feet and have to fly another three or four miles to gain it back. But we still didn't feel solid enough to drop a wing, get turned around, and headed back to the field. Now, of course, what you would normally do in an emergency is, leave the takeoff power on, two minutes or no. The trouble with that is that your head temperatures start getting out of bounds so fast when you're pulling takeoff power at that slow speed. The best angle of climb, as I mentioned before is 80 knots indicated, but as soon as you get up and out of the field, you might, by maintaining takeoff power, get up to about 90 knots.

"Now, that would help your cooling a little bit, but there is still a possibility of your engine becoming unglued before you get around the field. These 262 demonstrations were interesting to us, because there are a lot of DC-3's loaded to 262 and, legal or not, it can cause an awful lot of trouble in the event of an engine failure on takeoff in anything less than ideal conditions."

Piper: "Thank you very much, Buril. I think that is a very fine way to close this discussion."



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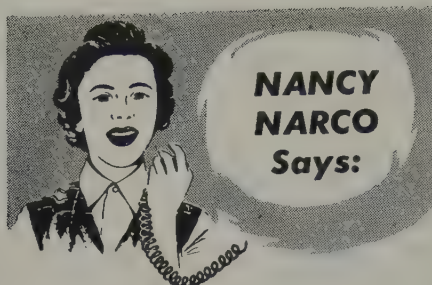
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IN THIS OPENING column I'd like to touch on a few random points . . . like radio pattern shadows. Some of the large airports have patches on their acreage where tower signals just fade out. Chicago Midway and LaGuardia both have their weak spots. Some other airports are the same way. If your call isn't getting through or you don't hear the man answer, move a little, or turn the airplane so there's a clear path between your antenna and the tower. And of course if there's a Connie between you and the tower you'll probably be blocked out in more ways than one.

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How High Should We Fly?

By Schuyler Kleinhans

Ass't Chief Engineer, Douglas Aircraft Co.

As everybody knows the atmosphere we live and fly in decreases in density and temperature as we go to higher and higher altitudes. Most people have had some experience at altitudes varying from sea level to about 10,000 ft. if they have traveled in our western states. A much smaller number have flown at altitudes up to 25,000 ft. Only a very few of us have had any real experience at altitudes above 25,000 ft. It is the purpose of this article to discuss the effects of altitude on the various functions and systems of a modern jet-transport airplane, to look at the many facets and glean from them a better and more intimate understanding of this new and improved airplane. By this method we hope to answer the question, *how high should we fly?*

For most people, the atmosphere is taken for granted. They are occasionally reminded of its presence by clouds, wind, rain, or extremes of temperature. To another and more technical group, the atmosphere is a standardized medium with its temperature and pressure defined by a mathematical equation. Truly, it is all of these things and many more. While we do not have time to delve deeply into meteorology, some is necessary for an understanding of our problem.

Figure 1 shows the average or standard temperature; Figure 2, the pressure as it varies with altitude. As can be seen, the variation of pressure with altitude is uniform and does not show much deviation. On the other

hand the variation in temperature is considerable. Figure 3 shows the variation of temperature and the height of the tropopause with latitude. Note that the tropopause is both higher and colder in the tropical latitudes.

A cross-section of temperature variation at any altitude averaged over a long period of time would show that while most days are within 20° F. of standard, there are a considerable number that are as much as 40° F. from standard and a few that are even 60°. This is important because airplanes must function normally in these extremes of temperature. Increasing the operating altitude of airplanes from 25,000 ft. well into the stratosphere can be seen to have lowered the range of our operating temperatures by more than 50° F. and reduced the pressure to less than one-fifth of the sea level value.

The extremes of temperature can be expected to produce great variation in the density of the atmosphere which in turn, due to the gravitational forces involved, produce both large and small mass movements in the air. If the mass of air affected is not too large but the resultant velocities are considerable, these movements are called gusts. They obviously cause stress and strain in an airplane flying through them. Figure 4 shows the variation of gust frequency with altitude in terms of the number of miles that must be flown to intercept

a gust of any particular value. Figure 5 shows the variation of gust intensity with altitude with the gust frequency as a parameter. The interesting thing about these two curves is that we must fly about 10 times as far at 25,000 ft. and about 100 times as far at 40,000 ft. as we do at 10,000 ft. to intercept the same size and number of gusts.

Figure 6 shows the result of these characteristics in terms of ride roughness for a number of different airplanes. As can be seen the ride roughness is cut approximately in half for each 5,000-ft. increase in altitude. However, it should be remembered that all airplanes must fly through the lower altitudes when taking off or landing. In this case, if an airplane such as the DC-8 were flown at its normal operating speed, it would ride rougher than a DC-7 but smoother than a DC-3. Its speed could be reduced in which case it could be equal to the DC-7. Figure 7 shows how the rough airspeed practically coincides with the cruising speed at altitude. This means that the pilot does not have to slow down when encountering rough air at high altitude.

Gusts, turbulence, and altitude immediately suggest questions of fatigue, cabin pressure and general structural integrity. Experience has shown that if structural quality is maintained and both the frequency and size of the loads are carefully considered in the design, reliable and trustworthy structures can be provided.

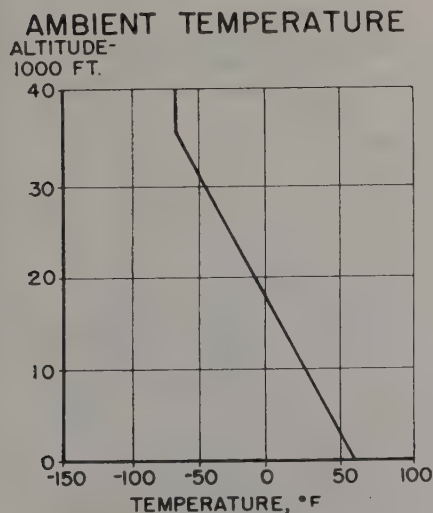


FIG. 1

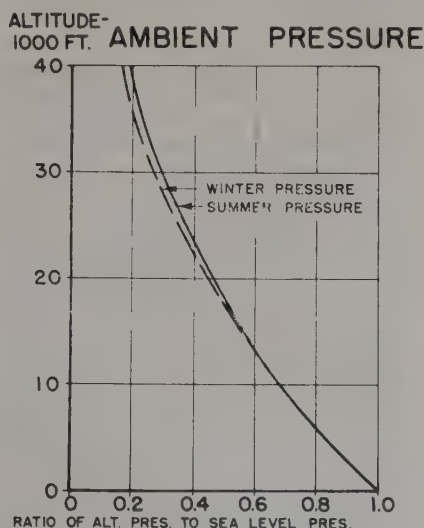


FIG. 2

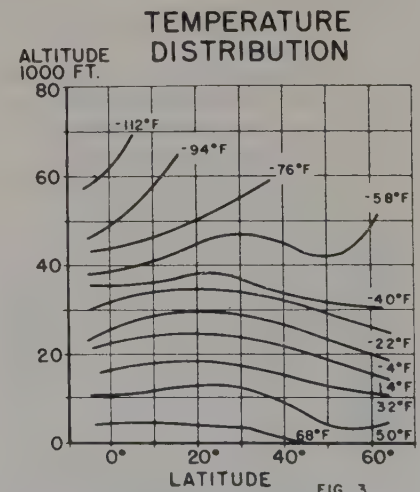


FIG. 3

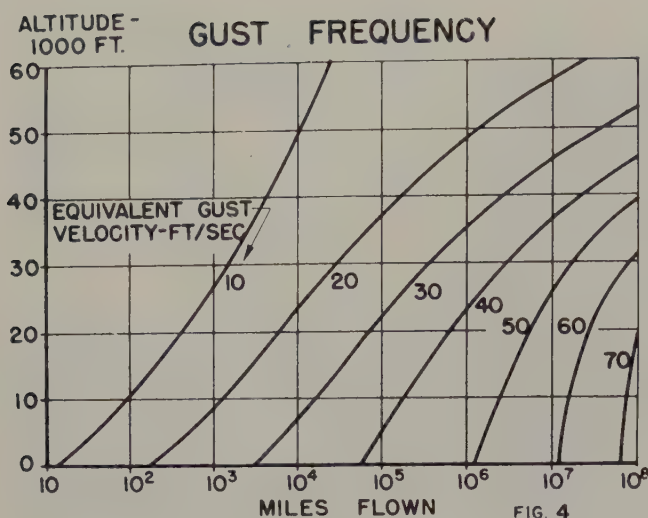


FIG. 4

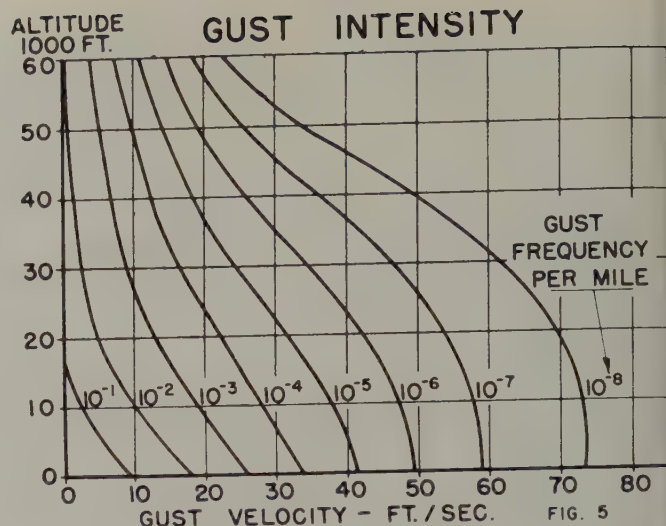


FIG. 5

The four main principles and their correlaries that have been found to provide safe structures are:

1. *Structures of unlimited life*
 - a. Stress levels
 - b. Frequency and magnitudes of loads
 - c. Quality of detail design
 - d. Fatigue evaluation
2. *Structures of limited life*
 - a. Where unlimited life cannot reasonably be provided, the life must be determined by analysis and test
 - b. A scheduled periodic replacement should be made
 - c. Structural parts should be used in multiples
3. *Structural arrangement should be such as to minimize the risk of catastrophic failure*
 - a. Multiple member structures
 - b. Retain a large fraction of the initial strength after the failure of any one element
 - c. Restrict the extent of the failure
 - d. Provide tear resistant and non-explosive type structure and details
4. *Inspection*
 - a. To guarantee safety of the structure
 - b. Discover accidental damage
 - c. Discover incipient failures before they have developed
 - d. To establish points where design improvements or life limits are required

Fatigue tests have shown that at the stress levels used in modern American transports the basic structure has a life of several hundred thousand hours. To be sure that the fittings and details have a similar life, it is necessary to make suitable adjustments in the stress levels and proper allowance for irregularities. This is best done by evaluating the detail designs by laboratory testing and matching them against the basic

structure. If this work is conscientiously done, a reservoir of design information results and the details are often equal to the basic structure to which they are attached.

Pressure cabins have received a great deal of attention by structural designers. The same principles apply to them as to the other structures. However, the tendency for a partial failure to grow into a catastrophic one is somewhat greater, so more care must be taken to provide a multiple structure and special provisions must be made to limit the extent of failures.

Right here it might be well to point out that it is general American practice to restrict the stress levels in pressure cabins at working pressure to the same general values that are used for the lg or unit acceleration loads in the wings. Actual stress values of 10,000 to 15,000 lbs. per square inch are commonly used.

After all steps have been taken in the design and manufacture of any product, the continued suitability of the product is dependent on its maintenance and repair. Airplanes are no exception to this rule. It is practically impossible to exaggerate the importance of inspection. This is particularly true in guarding against fatigue and incidental structural damage.

Windows, doors, and other closures are affected by altitude, not only in that they must be designed for the loads imposed, but they must have additional factors of safety because the safety of the entire airplane and its contents is dependent on them. Figure 8 shows the effect on cabin pressure if a window were permitted to fail. Figure 9 shows the effect on an average passenger under these circumstances. The need for absolute protection from such a mishap is obvious.

The air-conditioning system is actually made up of several such sys-

tems that work together to produce the over-all result. The system is divided into 1) the pressure-supply system, 2) pressure-control system, 3) flow-control system, 4) heating system, 5) cooling system, 6) ventilating system, and 8) the distribution system. Of these the pressure-supply system and the pressure-control system are certainly the most vital.

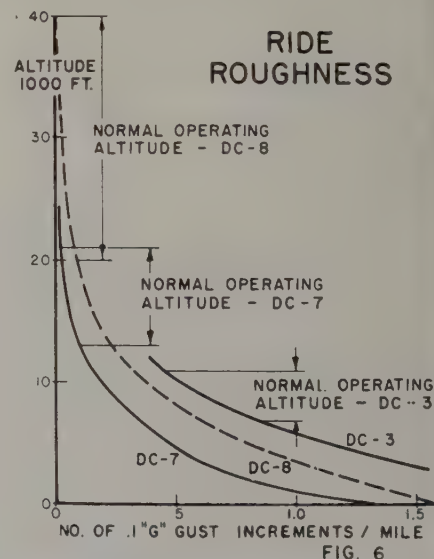


FIG. 6

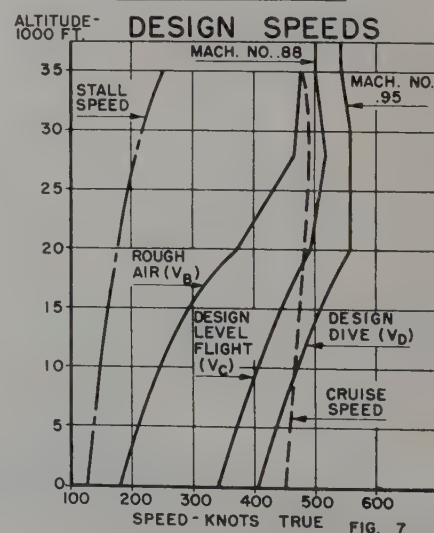


FIG. 7

DECOMPRESSION & DESCENT

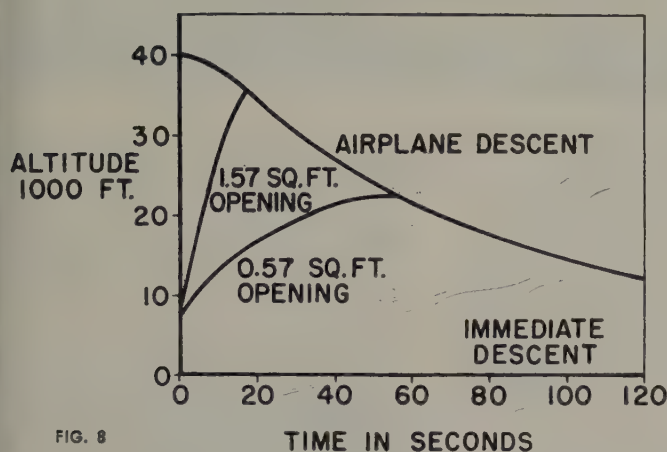


FIG. 8

These two systems are critical in an airplane designed for flight at high altitudes. Figure 10 shows the small amount of time available before the crew or passenger would become victims of anoxia if the pressure were lost instantaneously.

To protect against this eventuality the pressure-generating system is divided into several independent units. This division is such that any one of the units can maintain the pressure and any two can provide reasonable ventilation. Therefore, it can be assumed that the pressure-producing system is as reliable as the main propulsion system.

Reliability of the pressure-regulating system must be of the same order, but more important, it must be of the fail-safe type of design so that in case of failure it will continue the *status quo* until taken over by manual control.

The ventilation-control system is of great importance at altitude because in case of smoke, noxious fumes, or similar emergency, the cabin cannot be depressurized until the airplane descends to a safe altitude.

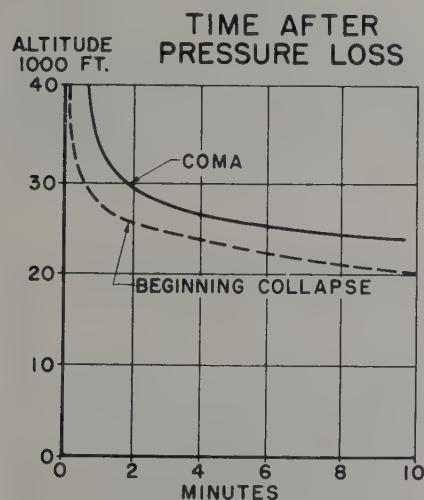


FIG. 10

The landing gear, hydraulic and control systems are affected by altitude principally due to the low temperatures involved. Actually, it is the temperature range that produces the problems for these items. The thermal contraction and expansion of parts, the stiffening of elastomers, and the viscosity of hydraulic fluids must be provided for or new materials must be developed. The addition of 50° to the temperature range can be expected to produce a host of minor maintenance annoyances, but is not expected to introduce any new safety problems.

The effects of altitude operation on the electrical system, radio, radar and instruments is primarily one of suitable insulation and satisfactory cooling. The insulation of much of our electrical equipment is dependent on keeping the circuits separated so that a suitable air gap is maintained. As altitudes are increased, these air gaps also must be increased inversely proportional to the density to maintain equivalent conditions, or the equipment must be insulated in some other way. Two other ways that have been

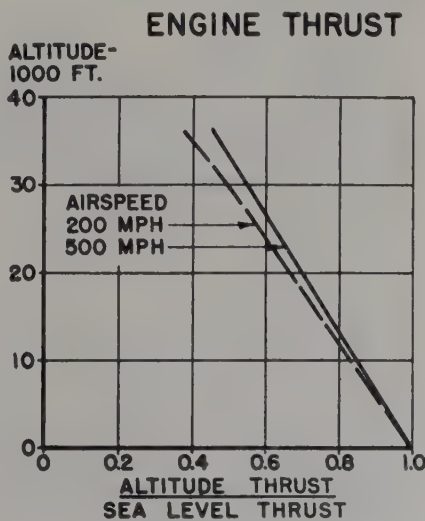


FIG. 11

OXYGEN AFTER DECOMPRESSION & DESCENT

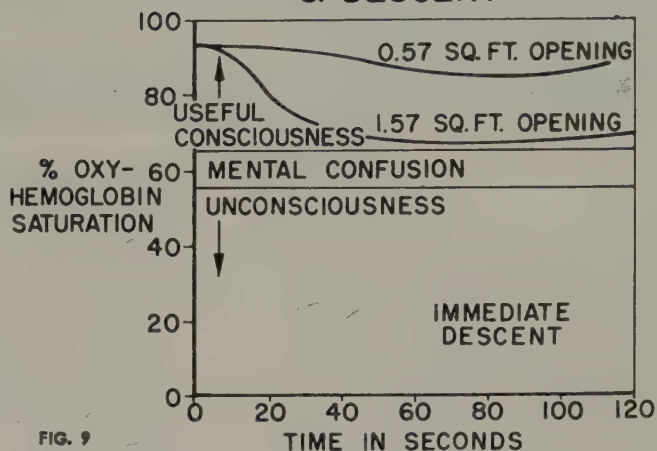


FIG. 9

proposed are pressurizing the individual units in hermetically sealed cases or potting the units in some suitable insulating compound.

Increasing the gaps makes the equipment larger, non-standard, and heavier. Hermetically sealing and pressurizing increases the weight and introduces serious maintenance problems. Potting increases the weight and makes maintenance virtually impossible except by outright replacement. At present, hermetically sealing and pressurizing seems to be the least evil choice.

The use of commutators, brushes, or slip rings is unsatisfactory under altitude conditions due to short life and has resulted in the development of alternating current systems so that equipment without these elements may be installed.

The problem of cooling any kind of heat-releasing equipment always has been severe. Altitude operation aggravates this situation because the density of the cooling air decreases faster

(Continued on page 42)

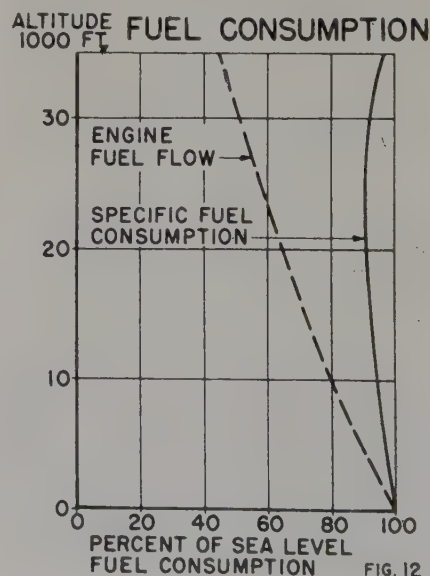


FIG. 12

navicom

Devoted to information regarding the operation of business aircraft from first scheduling through flight completion, and the factors bearing on those operations, such as facilities, equipment, problems of navigation and communications, airspace regulations, new ATC procedures and new flying techniques. Comments and suggestions are invited.

Weather Briefing By Closed-Circuit TV Forecasts Expanded Service

With the consolidation for economy and other reasons of airways communications and weather services, obtaining first-hand all-inclusive weather and forecast service at smaller enroute terminals has become very critical. Quick scanning of sequences, 12-hour terminal forecasts, etc. by pilots assisted by a communications operator is never comparable to the excellent briefing obtained at a weather station.

The use of multiple radars, TV, and microwave relays to bring a more complete and instantaneous picture to the forecaster reported on in December *Navicom* is now complemented by the possibility of using TV to get the results of that improved forecasting ability out to outlying stations. Again, military necessity sparks what will someday be a civil practicality.

"Weathervision," the closed circuit television system for providing weather briefings recently installed on a trial basis by the Air Defense Command at Grandview Air Force Base, Mo., already has proved its worth.

According to a report from Headquarters Central Air Defense Force at Grandview, Weathervision during its approximately 2 months of use had increased materially the efficiency of the local weather station, and shortened the time needed by pilots to prepare weather flight plans. Moreover, the saving in personnel alone has compensated for the operating cost of the equipment.

Weathervision brings up-to-the-minute weather data and information to remote locations by the touch of a button. Every day, all week, the system provides current weather information to the ready room and alert hangars at Grandview AFB, and wherever its receivers are installed.

The system operates from a central telecasting station, and the central forecaster can answer requests from any of the 10 receivers presently in use, which eliminates tie-up of receivers and permits constant utilization of each of the sets by the various using agencies.

Similar units are being installed at Otis and McGuire Air Force Bases in Massachusetts and New Jersey.

10 Lb. 3-Axis Autopilot Eliminates Current Drain

The problem of high current drain, imposed on single and light-twin business aircraft by the constant addition of more radio, instrumentation and autopilot devices, has become a dilemma that even the use of larger generators has not solved. (Ed. Note: See Round Table—"Minimum Equipment"—August '56)

At a time when autopilot control is most useful, as working high-density area or IFR problems with the multiplicity of navigation and communication radio requirements, the resultant voltage deficiency frequently produces either radio or autopilot malfunction or both. Until somebody produces radio gear that operates on near-zero amps, the Tactair (Bridgeport, Conn.) pneumatic autopilot briefly reported on in October *SKYWAYS* looks like the best answer yet and merits additional detailed description.

The Tactair T-3 provides automatic flight control in all three axes. Pitch

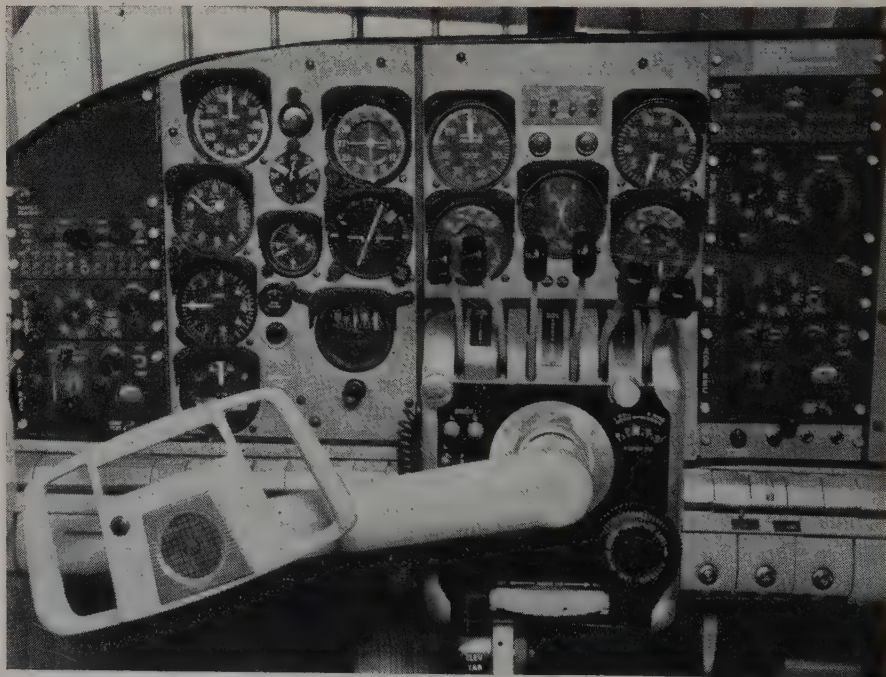
and roll control is derived from pneumatic sensing units on a modified artificial horizon and heading control from the directional gyro. By the use of pneumatics for both sensing and operation of the flight controls considerable complexity and weight have been saved.

Command Control

Control is accomplished with a small, compact unit conveniently located on the instrument panel or throttle quadrant. Straight flight and turns are controlled by a knob on the face of the control head or, with heading lock engaged, the directional gyro. Turns up to standard three degrees per second can be effected by turning the knob left or right. A supplementary trim control is incorporated for straight flight. Level flight, climb or descent are controlled by another knob on the side.

Heading Lock and Heading Memory

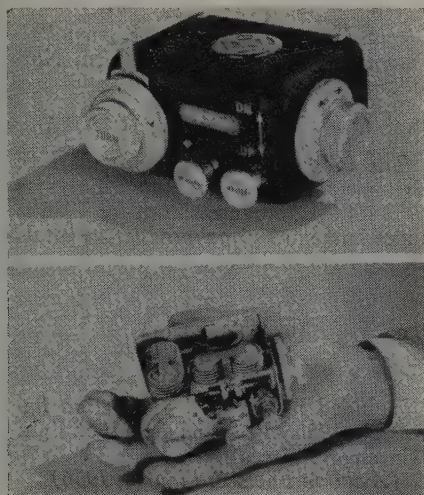
Unique feature of the Tactair autopilot is its ability to fly the airplane accurately on any specific heading desired. This is accomplished by the



INSTRUMENT AND RADIO PANEL designed by Aircraft Radio Corporation for the Twin Bonanza is arranged for maximum pilot-copilot efficiency and coordination in actual IFR cross-country, as well as demonstrating ARC's navigational and communications line. Functional groupings are (left, top to bottom): blank where VHF communications Unit #1 usually goes, plus Marker Beacon light, Glide Slope receiver control plus Pilot's Audio and Mike Selector panel, VHF Nav. #1, including omni and localizer, and ADF #1. Second from left: Blind Flight Group plus omni course selector, ADF fine-tuning meter, course director function switch. Center panel: engine instruments and switches, throttle quadrant, starter switches, prop and tab controls. Right: Copilot's Audio and Mike Selector panel, VHF Communications Unit #2, VHF Nav. #2, including VOR and Loc, ADF #2 (note compass test switch, slews meter for check without laborious detuning), and Marker Beacon Light.

Tactair's heading lock which is put into operation by pushing a small button on the command control which engages the special course selector incorporated in the directional gyro.

The course selector consists of an additional circular heading card installed by Tactair above the regular compass card of the directional gyro. If a pilot wishes to fly a pre-determined course of, say, 312 degrees, he sets the course selector card to that heading, then pushes in the heading lock. The Tactair T-3 will then automatically turn the airplane to 312 degrees and hold it to that course indefinitely. The heading lock takes hold and will bring the airplane on course even if the plane is heading as much as 90 degrees to either side of the desired course.



COMMAND CONTROL unit of Tactair T-3 pneumatic autopilot for business aircraft mounts neatly on the instrument panel or throttle quadrant. Inside the command head are pairs of aneroid capsules which relay pilot's directions to the control servos. This system requires no warm-up and is ready for use at any time.

The directional heading capability of the Tactair also has an inherent heading "memory." If for any reason it is necessary for the pilot to alter course by manually over-riding the autopilot, the airplane will automatically return to the pre-selected heading as soon as the pilot releases the controls.

Proves Highly Valuable for VOR or ILS Tracking

The latter two features are most appreciated in flying a VOR or ILS localizer track where the task of seeking the proper heading and then holding it keeps the pilot, when flying the airplane manually, constantly on his toes.

With the heading lock, the pilot can set his course selector to the heading indicated on his VOR receiver or for the ILS track. If wind causes drift to one side or the other of the desired track, the pilot merely turns the course selector of his DG to the new corrected heading and the Tactair pilot automatically makes the correction. Especially on flying the ILS localizer track pilots find the heading lock does a much more precise job than can be done manually.

Operation and Design

The delicate sensing of attitude changes is done by adaptation of an air gauge long used in laboratories and quality control which gives instant and accurate indication of pressure change through a suction orifice as the amount of air space varies over the hole.

Precision-built cams, which move as the gyros register changes in attitude of the aircraft, vary the gap of air over the suction gauges. This produces variations in amount of suction tapped from the vacuum pump of the aircraft's engine and relayed to pneumatic amplifiers actuating the system servos, which move the controls.

The suction gauges or sensing units in the gyro instruments relay the variations caused by changes in roll, pitch or direction and through simple valving create variations in the suction fed to the servos.

The variable sensing, inherent in a pneumatic system, eliminates the "on-off" action which is characteristic of electrically operated autopilots and which leads to jerky hunting as electric servos clutch in and out to move controls. In the case of the Tactair system, a slight change in attitude produces a correspondingly slight signal and resultant increase in vacuum to the servos. A big disturbance produces a big signal with the result that control forces are smoothly applied in exactly the same manner as a pilot would vary the degree and extent of control movement to counter any particular disturbance to level flight.

The Tactair has an inherent force followup characteristic which eliminates much of the complexity found in many current autopilots, minimizes the possibility of the autopilot getting out of adjustment, and greatly reduces installation problems.

Linkage of the actual servos to the aircraft's system is direct without need for clutches. The autopilot can be easily over-ridden by the pilot. Except when making changes the Tactair pilot remains passive.

Simplicity

The Tactair is an overall unit of extremely light weight and simplicity, involves no electric motors, no drain on the electrical system and no electronic tubes. Without any warm-up requirements, the auto-pilot can be instantly engaged by depressing an engaging button on the control head.

The entire weight of the unit fully installed is less than 10 pounds excluding the two modified gyro instruments which replace existing equipment in the airplane, hence are considered as part of the aircraft's weight. The modified instruments, completely overhauled, are supplied with the Tactair pilot as part of the installation kit.

While cams are installed within the cases which house the gyro instruments there is no mechanical contact with the actual gyro-operated parts of the artificial horizon or directional gyro. The absence of microswitches or brushes in direct contact permits the gyro units to operate completely undisturbed.

Development of the Tactair pilot started as research, for the Navy, headed by Wm. Harcum, previously with Sperry in autopilot development. Initial idea was to develop flight indication to let the pilot "feel" the plane's attitude. The tactile indicator was developed on the premise that in some conditions the pilot may wish to fly on instruments but feel free to monitor visual references.

CAA approval of the Tactair pilot for the Beech Bonanza was granted two years ago when the first four pilot models were put into flight test on four Bonanzas in the Philadelphia area. Next installations scheduled to be made for CAA approval will be in the Cessna 180 and Piper Tri-Pacer with approvals in the light twin-engine aircraft anticipated in the first half of 1957.



MODIFIED DIRECTIONAL GYRO of Tactair T-3 autopilot has heading card installed above regular compass card of gyro.

Preferential Routings New York-Phila. Area

For the information of pilots filing IFR plans in and out of the New York-Philadelphia areas, the New York ARTC Center has revised the routings previously published. As before, pilots not equipped for VOR navigation should file LF routes comparable to the following. Also, deviations from Preferential Routings may be requested as before, specifying reasons such as thunderstorms, inoperative radio aids, etc. Routes to the first fix shown will be assigned in the departure climbout instructions before take-off.

In the following listing, the VOR route is indicated in italics after the name of the destination city.

DEPARTING NEWARK (Includes Teterboro)

North—Albany, or over: *Poughkeepsie LFR V39, POU VOR V91E.*

Northeast—Hartford, or over: *POU LFR V39, V58.* Boston, or over: *POU LFR V39, V58, V130, V16.*

South—Atlantic City, or over: *Colts Neck, Asbury VI.*

Southwest—Phila.: *Belle Mead V3, B20.* Balto.: *Belle Mead V3, V93.* Wash.: *1. Belle Mead V3, District, Riverdale A7. 2. Stroudsburg V39 Parkton, V3, District, Riverdale A7.* Beyond Washington.: *1. Belle Mead V3, V93, Herndon, Etc. 2. Stroudsburg, V39 Parkton, V3 District Riverdale A7.*

West—Pittsburgh: Stillwater V226, V188, V250, Ellwood City, Direct Pittsburgh. Columbus, or over: Stillwater V226, V188, V119, Wheeling V12. Cleveland, or over: Stillwater V226, V188, V14.

Northwest—Chicago, or over: Stillwater V226, V188, V184, V116. Detroit, or over: Stillwater V226, V188, V26, V90. Elmira, or over: Stillwater V153, V36. Binghamton: Stillwater V153, V29. Rochester, or over: Stillwater V153, V29, V34. Syracuse: Stillwater V153.

DEPARTING LAGUARDIA

North—Albany, or over: 1. Wilton V91, POU V91E. 2. POU LF, V39, POU VOR V91E.

Northeast—Hartford or over: Bay V167. Boston, or over: 1. Bay V167, V34, V16. 2. Glen Cove V46, Riverhead V16.

South—Atlantic City or Beyond: 1. Belle Mead V3, V29, V1. 2. Riverhead V16, V1.

Southwest — Philadelphia: Belle Mead V3, B20. Baltimore: Belle Mead V3, V93. Washington: Belle Mead V3, District Riverdale A7. Beyond Washington: Belle Mead V3, V39 Herndon, Etc.

West—Pittsburgh: Branchville V36, V58, V188, V250, Ellwood City, Direct Pittsburgh. Columbus, or over: Branchville V36, V58, V188, V119, Wheeling V12. Cleveland: Branchville, V36, V58, V188, V14.

Northwest — Chicago, or over: Branchville V166. Detroit, or over: Branchville V116 Erie, V14N, V188, V26, V90. Buffalo, or over: Branchville V36. Rochester: 1. Branchville V36, V29, V34. 2. Wilton V34. Syracuse: 1. Branchville V36, V153. 2. Wilton V34, V153.

DEPARTING IDLEWILD AIRPORT

North—Albany, or over: Glen Cove, Syosset V91, Poughkeepsie V91E, Albany V91.

Northeast—Hartford, or over: Glen Cove, Syosset V167. Boston, or over: Riverhead V16.

South—Atlantic City, or over: Woolf Coyle V1.

Southwest — Philadelphia: Woolf Coyle V140, V29, V166. Washington, or over: Wolf Coyle V16, Andrews Direct.

West—Pittsburgh: Stillwater V226, V188, V250, Ellwood City, Direct Pittsburgh. Columbus, or over: Stillwater V226, V188, V119, Wheeling V12. Cleveland: Stillwater V226, V188, V14.

Northwest—Chicago, or over: Stillwater V226, V188, V184, V116. Detroit, or over: Stillwater V226, V188, V26, V90. Buffalo, or over: Stillwater V153, V36. Rochester: Glen Cove, Syosset V91, V34. Syracuse: Glen Cove, Syosset V91, V34, V153.

INBOUND IFR FLIGHTS

North—From Albany, or over, to EWR: V91, Poughkeepsie Direct Greenwood Paterson Direct EWR LOM; to IDL: V91; to IGA: V91 Wilton V1.

Northeast—From Boston, or over to IDL: V16, V46, G5 Long Beach Direct Idlewild. From Hartford, or over to EWR: V58 Poughkeepsie Direct Greenwood Paterson Direct Newark; to IDL: Salem V16, V46 Long Beach Direct Idlewild; to IGA: V3 Wilton, V1.

South—From Norfolk, or over to EWR: V1 Asbury, Colts Neck Direct Preston, Direct; to IDL: V1 Coyle V16 Point Pleasant Direct; to IGA: V1 Asbury Direct Colts Neck Direct.

Southwest — From Washington to EWR: Riverdale Baltimore LF R45 V140 Port Deposit A7; to IDL: 1. Riverdale Baltimore LF R45 V140 Woodstown V123 V166 Red Bank Direct Scotland. 2. Riverdale Baltimore V44 V16 Point Pleasant Direct; to IGA: Riverdale Baltimore LF R45 V140 Woodstown V123.

West—From Pittsburgh to EWR: V35, V6 SEG V168 A7; to IDL: V35, V6 SEG V168 Colts Neck Red Bank Direct Scotland; to IGA: V35, V10 G3. Over Pittsburgh to EWR: V12 V162 V168 A7; to IDL: V12 V162 V168 Colts Neck Red Bank Direct Scotland; to IGA: V12 V162 V39 V10 G3 or V35 V10 G3. From Cleveland, or over to EWR: V6 SEG V168 A7; to IDL: V6 SEG 168 Colts Neck Red Bank Direct Scotland; to IGA: V6 Selings Grove V10 G3.

Northwest—From Detroit, or over to EWR: V116 V170 V168 A7; to IDL: V116 V170 V168 Colts Neck, Red Bank Direct Scotland; to IGA: V116 V170 Selings Grove V10 G3. From Buffalo, or over to EWR: 1. V36 V147 V168 A7; 2. V36 V72 V34 Eddy Huguenot Greenwood Paterson Direct; to IDL: V36 V147 V168 Colts Neck, Red Bank Direct Scotland; to IGA: V36 V147 V10, G3. From Rochester to EWR: 1. V147, V168, A7; 2. V34 Eddy Huguenot Greenwood Paterson Direct; to IDL: V147, V168 Colts Neck Red Bank Direct Scotland; To IGA: V147, V10, G3. From Syracuse to EWR: V29, V34 Eddy Huguenot Greenwood Paterson Direct; To IDL: V29, V34, V91; To IGA: V29, V34, B18, Peekskill Direct White Plains LOM, Direct New Rochelle Direct.

DEPARTING PHILADELPHIA INTERNATIONAL

Wilkes Barre, or over: Wings B20, V149.

Detroit, or over: Reinholds, V162S, V12, V42.

Cleveland, or over: Reinholds, V162S, V12, V42.

Pittsburgh, or over: Reinholds, V162S, V12 Johnstown, V12N Reinholds, V162S, V12.

Washington: Westchester V3, District Riverdale, A7.

Beyond Washington: Westchester V3, Herndon, Etc.

Norfolk, or over: V239, V1.

INBOUND TO PHILADELPHIA INTERNATIONAL

VOR ROUTES—From Idlewild Airport: Woolf Coyle V140, V29, V166. From LaGuardia or Newark Airport: Belle Mead V3, B20. From Wilkes Barre, or over: V29, B20. From Detroit, or over: V116, V33, V12 Westchester Direct. From Cleveland, or over: V6, V33, V12 Westchester Direct. From Pittsburgh, or over: V12, Westchester Direct. From Washington, or over: Baltimore LF R45, V140, A7. From Norfolk, or over: V1, V29, V166.

Civil Aircraft Production: 1952-56

The following figures represent U.S. civil aircraft production for the years 1952-1956; the figure shown for 1956 is an estimate based on production totals through November.

1952	3509
1953	4134
1954	3389
1955	4753
1956	6577

Included in the civil production figures for 1956 is an estimated 1066 light twin engine aircraft.

(Aviation Facts & Figures, 1956)

Side Operated Tank Drain Valve

Designed to eliminate the disadvantages of present center-operated drain valves, a new valve is being produced which features a small, separate lever on the side which can be operated with one finger, or a screwdriver or other small tool. A slight upward push opens the valve, with the operator's hand completely out of the line of flow of fluid.

The new unit is manufactured by Technical Development Co. under the name *Tedeco Drain Valve*. The company also produces a newly designed drain fitting which may be used in conjunction with the valve. The fitting is said to be fluid-tight entirely through a magnetic connection, which also facilitates connecting the valve to the fitting. The valve opens automatically when the drain fitting is applied, and closes when the drain is removed.

Both units are expressly designed for fuel tanks, oil tanks, hydraulic reservoirs, gear cases and other liquid containers used on aircraft.

Extra Fuel Tanks for Beech Super 18

Beech Aircraft Corp. announces the availability of outboard wing tanks, which will allow a sizable increase in fuel capacity for range extension of the Super 18.

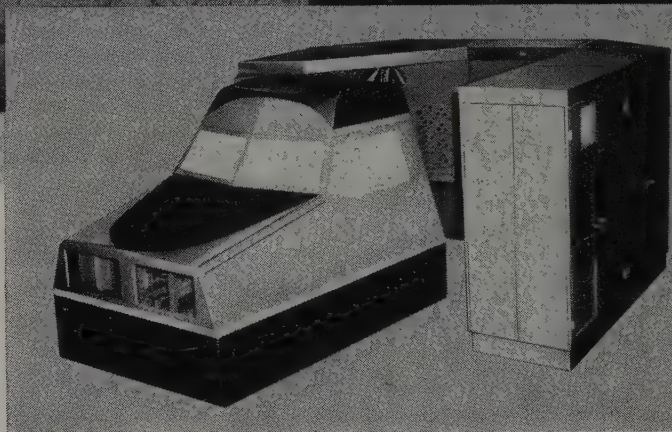
This optional item can be incorporated into Super 18s now on the production line. Wing tank kits will not be offered because of the necessary engineering changes in internal structural design and strengthening of the outer wing panel.

ONE-DIRECTION AIRWAY SEGMENTS

From	To	Airway	Altitudes	Flight Direction
DCA bdry.	PHL	V140/A7	6000—12000	North (Enrt over PHL)
CAT	DCA bdry.	V3/\$72	4000—12000	South
PSB	CYE	V10	8000—17000	East
PSB	BMD	V6/G3	8000—17000	East
CDW	STW	V153	3000 and up (all Alts.)	West
PNJ	AVP/VOR	V116/V36/R23	MEA and up (all Alts.)	West
BOS bdry.	ILT/PCH	V3/A7	6000—9000	South
HEM/FIR	BOS bdry.	G5/V16	4000 and 5000	North



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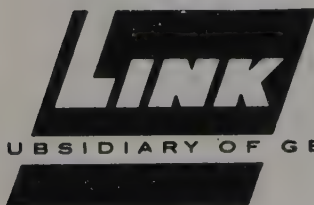
Link's E-600, America's first commercial twin-engine ground trainer, is being used daily by Flight Safety, Inc., at New York's LaGuardia to improve proficiency of flight crews of the nation's busy corporation aircraft.

More than one hundred aircraft operators in business and industry are charter subscribers to a new cooperative use program under which pilots and co-pilots regularly practice complex flight and navigational procedures on the E-600.

The E-600 provides the most complete radio aids simu-

lation for realistic drills . . . enables pilots to receive up to four stations simultaneously . . . permits instructors to reproduce engine failures, fires, instrument malfunctions and other emergencies. The ultra modern DC flight computing system is the first ever used in a production electronic flight trainer for the training of commercial pilots.

Link's E-600 is ideal for training crews of all existing twin-engine aircraft used by corporations—without costly operation of actual aircraft.

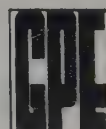


Pioneer and World's Leading Producer of Flight Simulators

AVIATION, INC.

SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

BINGHAMTON, NEW YORK



safety exchange

A clearinghouse of practical information on recent developments affecting flight safety. This will include Performance Pitfalls, factual accounts and analyses of actual, in-flight occurrences (near misses, unusual in-flight experiences, conflicting traffic clearances, and other incidents of non-routine nature. In addition, CAA, CAB reports and other sources will be briefed.

Ralph Piper, Chief Pilot, Monsanto Chemical Co., St. Louis, is NBAA coordinator of the Safety Exchange. Readers are urged to advise Mr. Piper of all ideas which may contribute to the safety of business aviation. Address him c/o SKYWAYS for Business, 122 East 42nd Street, New York 17.

Pyle Urges Establishment of Program Following Seven Safety "Musts"

Specifying seven essential safety factors with the suggestion that a program be established to bring them to the attention of the pilot group, James Pyle, CAA Administrator, has directed a letter to the NBAA and to various scheduled and irregular air carriers, the military, and other aviation organizations, requesting assistance in "the near-miss problem."

Pyle's seven safety factors follow:

1. **"Vigilance"**—The concept of 'see and be seen' is rapidly nearing obsolescence; there is as yet no substitute for maintaining a thorough watch for other air traffic at all times. Laxity, by crew member(s), or inattention to duty cannot be tolerated under today's traffic density.
2. **"Crew Coordination"**—In the case of multi-engine equipment, training programs must stress the need for close teamwork of all flight crew members and should establish clear-cut areas of duty and responsibility.
3. **"VFR Flight"**—VFR flights must not be attempted in marginal weather conditions.
4. **"Adherence to Flight Plans and Established Procedures"**—Cutting corners or other deviations are not to be tolerated. Departures from flight plan or established procedures to save a minute result in ineffective traffic control.
5. **"Procedures and Regulations"**—Failure to adhere to regulations and procedures can endanger all flights in an area. Regulations and procedures must be thoroughly understood and rigidly adhered to in the interest of everyone's safety.
6. **"Position Reports"**—Pilots must keep abreast of their position and report it accurately as required. If a fix is missed, or a definite position is not known, traffic control must be advised in order that they can plan accordingly.
7. **"Radio Transmissions"**—Radio dis-

cipline should be rigidly enforced. Transmissions must be clear; unnecessary conversations cannot be tolerated."

Mr. Pyle put special stress on #7, adding that it had been his experience, while guarding 126.7, that pilots are sometimes careless in filing flight plans in the air, and seem to have no set pattern. This requires excess questions and answers on basic information.

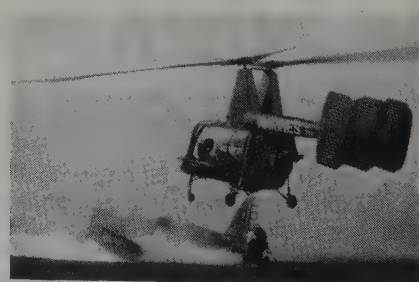
The importance of these seven points has been established by the analysis of various near-miss reports, and although some of them are elementary, they are also fundamental and essential.

Mr. Pyle emphasized the fact that his attention is directed toward pilots not as criticism of the present situation, but rather because they represent the "front line" of any aviation safety measures. He wants to present the basic facts of safe flying to the men who are most actively concerned with them.

Response of NBAA to this request is only as good as the response of the individual pilots. Business Aviation has a fine record of air safety, and as mileage-leader in the aviation field we have a clear obligation to show of "how to do it" in safe flying.

Kaman Trials Show Helicopter Value As Airport Fire Protection Equipment

The sight of at least one or more helicopters sitting around on any airport today has become so common that it almost seems strange that very little effort has been expended to find new uses to add to their known capabilities. Actually, aside from blowing skirts of prospective women passengers, the strong downwash has only been used by 'copters to maneuver small boats and liferafts in desired directions on water.



An aerial fire engine to combat airplane-crash fires and accomplish quick rescue of the occupants is proposed by Kaman Aircraft in cooperation with the Ansul Chemical Company, manufacturers of fire-fighting devices.

The aerial fire engine, which is a Kaman HOK-1 helicopter carrying a pilot, a 3-man fire-fighting team, and Ansul dry chemical fire extinguishers, has successfully demonstrated the time-saving method of rescuing personnel involved in aircraft fires. The helicopter, in addition to transporting the crew

and equipment to the scene of the crash, aids in the fire-fighting and rescue by beating down the flames with its powerful rotor downwash.

Speed in getting the men and equipment into action and completing the rescue mission is the outstanding characteristic of the aerial fire engine operation. A series of simulated rescues conducted by Kaman Aircraft have shown that the elapsed time, from the arrival of the helicopter at the scene of the crash, until the dummy "pilot" is rescued from the burning airplane, is consistently under 45 seconds.

In actual operation, aerial fire engine helicopters with rescue crews and equipment on standby at military air bases and civilian airports could quickly reach the crash and go into action. Firefighting and rescue operations by helicopters could be carried out even when crashes occur in areas which are inaccessible to ground-operated fire engines and rescue trucks.

CAA Gets Jets to Train Key Air Safety Aides

CAA is launching a flight training program in jet aircraft for its key aviation safety inspectors and flight test engineers. Safety inspectors to be trained will include those who deal with executive jet aircraft as well as inspectors of airlines operations.

CAA has taken delivery of a T-33 jet trainer and two F-80C's. All are on loan from the Air Force, to be used in conjunction with the Link jet trainer already installed at the Aeronautic Center, Oklahoma City.

The training program will qualify about 30 CAA men on jets during the first year. Each will get 30 flight hours, beginning on the two-place T-33 with a CAA instructor, and progressing to the single-place F-80C. They may also get time on the two B-57's which CAA has borrowed from the Air Force, at such time as they can be spared from high altitude flight testing of air navigation, traffic and communications facilities.

CAA already has some flight instructors checked out, and CAA jet aircraft maintenance men began training at Sheppard AFB this month.

Ease Security Control on Air Traffic

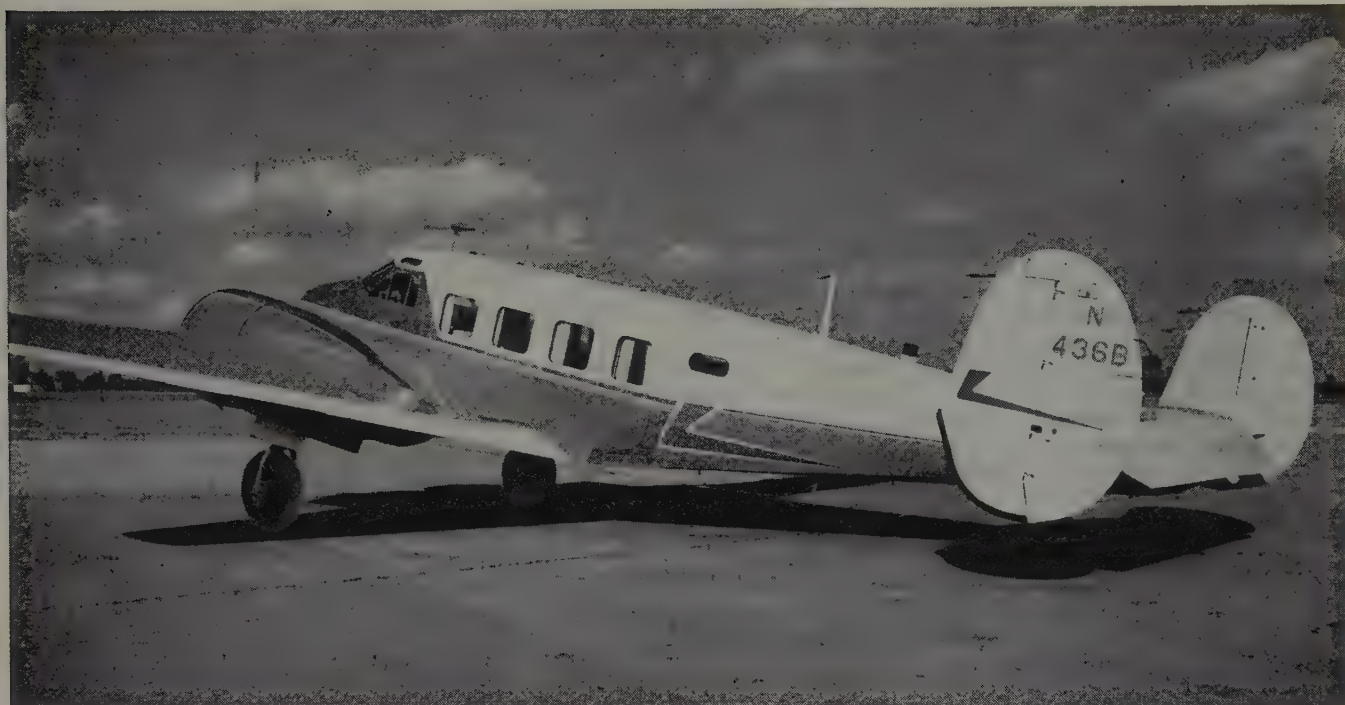
The general easing of the rules governing the Security Control of Air Traffic, effective Jan. 1, 1957, will serve to simplify operations for business, agricultural and private flyers.

Under the revised Part 620, Regulations of the Administrator, air traffic which originates within Air Defense Identification Zones (ADIZ) and follows a course away from the two existing Defense Areas, and any traffic

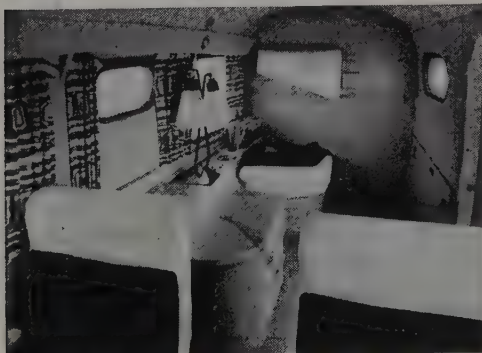
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Remmert-Werner custom deluxe interior. Completely appointed for comfortable and efficient executive travel. All extras included.



Looking aft; functional modern desk and utility arrangement shows ease of access and roomy interior.

Custom appointed D18S completely equipped for executive use; ready to go, now . . . anywhere!

Here is executive transportation at its finest! And it can be yours now. This privately owned, professionally flown and maintained Beechcraft D18S is ready to take you where you want to go . . . when you want to go, quickly, safely and in utmost comfort. Custom appointed interior by Remmert-Werner. Extra-large windows, electric step at cabin entrance. Bar buffet containing icebox, liquor storage, service for 6, hot-cup Thermos bottle, paper cup dispenser and bottle cabinet. Total flying time 3,661 hrs., 30 min.; hours since major airframe overhaul by Southwest Airmotive: 1200 plus hrs. Ship has always been hangared, cannot be told from new. May be inspected at Decatur, Illinois, Municipal Airport at your convenience, or special arrangements for inspection can be made.

Description and Equipment

Engines: P&W 450HP, new cylinders, new component parts Jan. 7, 1955.
Total time both engines: 700 hours.
Hamilton Standard Hydromatic Propellers: De-Icers, full-feathering.
Lear L-2-C Auto Pilot with F-5 Servo's and Approach Coupler.
Lear 1404B Altitude Controller
Lear LR6B OMNI • Lear ADF 12
Lear LVTR 36 Channel Transceiver
Lear R. T. 1062 Receiver
Narco D. M. E.
Bendix 433F A. D. F.

2T4N Range Receiver
A. R. C. 15B OMNI
A. R. C. T11 Transmitter
B. C. 1333 Marker Receiver
RB9M Glide Path Receiver
80 gallon Nose Tank
Windshield Wipers
Rotating Beacon • Nose Taxi Light
Cabin Radio • Cabin Intercom
Anti-Icer System
Airline Clearance Lights
Custom Deluxe Interior

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HUNTER MOODY, PRESIDENT, SAFEWAY MFG. CO., BOX 607, DEPT. AVP, DECATUR, ILLINOIS, PHONE 8-4441

which leaves the U.S., will no longer be subject to the security rules.

(The Eastern Defense Area comprises territory east of a line from Minnesota through eastern S. Dakota, Neb., Kan., Okla., Ala., and west Ga. Western Defense Area is a strip down the west coast about the width of Cal.

Prior to relaxation of the regulations pilots flying into and through ADIZ had to file IFR and make periodic position reports, or DVFR plus position reports. Recent rule changes and the Dec. 1st deletion of Albuquerque ADIZ exempts over half the air traffic previously required to observe provisions of Part 620.

January 1st changes also included deletion of the Northern ADIZ west of the 121° meridian, west of central Washington state. Designation of a Canadian Security Identification Zone nearby made the change possible.

Penn. Court Says Power Lines Over Water Should be Marked

A recent opinion of the Pennsylvania Supreme Court, overruling the Court of Common Pleas, has held that an action for trespass will lie against a power company whose transmission lines span a river, thereby creating an aerial hazard.

The case involved the death of a pilot whose Piper Cub crashed into the wires while flying at a height of 185 feet. In disposing of the contention that the pilot was violating both Federal and State altitude regulations, the court stated that the regulations were not applicable over open water—in this case the Susquehanna River—nor over sparsely settled areas. The power company, furthermore, had a duty to make the lines and supporting towers perceptible to pilots by the use of suitable markings. Since the advent of the airplane, rights of property owners carry with them certain limitations so far as the airspace is concerned.

Traffic Won't Stay Separated

News of careless operations comes from an air transport pilot as follows:

"According to CAR 60.32, all aircraft flying westbound on even-numbered Victor Airways and the Red and Green LF Airways must fly at even-thousand elevations. Those flying eastbound must be at odd-thousand altitudes. The purpose, of course, is to separate traffic going in opposite directions, just as we are supposed to drive an automobile on the right-hand side of the road.

"I have lost count of the number of aircraft that I have heard giving position reports which showed them to be in direct violation of CAR 60.32, but last night was a typical example.

"Gila Bend, Arizona, is on Victor Airway 66 and Red Airway 83. I reported over Gila Bend 8000 DVFR at 19:45 PST headed westbound. Within 15 miles of Gila Bend, to the East and on the same airway, I counted 10 aircraft flying eastbound at exactly my altitude! Needless to say, it was congested up there."

John Doe Wants to Know:

1. "When will the Air Defense Committee take a realistic viewpoint in establishing the Air Defense Identification Zones? There must be thousands of wasted hours trying to make a violation stick on the many who inadvertently have fractured the rules.

"In the first place, does anyone on the planning committee harbor an idea that an invasion will be coming through the southwest and not be detected until reaching the zone as now outlined? Do they think that invasion airplanes will be coming at the speeds of any of our low altitude transports?

"If and when an invasion is started the people who are engaged in watchdogging out back doors are going to be wasted man power. Certainly taxpayers money could be spent to a greater advantage at the present time than to have hundreds of people chasing Bonanzas and lesser aircraft all over the midwest.

"Let's have some one from the Air Defense Planning Committee give us an explanation of this ridiculous ADIZ out here in the peace-loving west. It is fouling up some otherwise nice unrestricted flying."

2. "Have you heard about the twin-engine airplane landing in a golf-course with both engines out? From a piloting standpoint, it was a fine job of flying, and would have been very successful if it had not been for the glare of a setting sun, which prevented the pilot from seeing a bunker that was designed to give trouble not necessarily to aircraft. With interference from the bunker the airplane became junk, and investigations followed which indicated that the pilot had been trying out the elastic qualities of aviation fuel. Would have made it, too, if the airport had been where the golf course was. Inconsiderate planning on the part of the city fathers and lack of adequate planning on the part of the pilot in not stopping to refuel someplace along the route. Every professional pilot, at one time or another, has tried sweating it out with a low fuel supply, but, frankly, it just isn't worth it. Ask a pilot who has missed by a bunker."

3. "Do you know that, if you go into Nashville regularly, you will be doing everyone a favor, even the tower operators, if you will write to the airport management about the impossible communication situation? While parked anywhere south of the terminal building the tower or ground control can only be heard intermittently, and certainly not with any dependability.

"This is a situation which is next to being downright dangerous, and needs immediate attention. After the last trip out of Nashville, when the clearance to taxi and to take off was given by a green light, the tower was contacted after take-off, and they advised that letters of protest might help, and that all efforts on the part of tower personnel had so far failed to correct the situation. It seems to be caused by the location of the tower antennae. Meanwhile, airplanes are taxiing about a busy airport without control."

Pneumatic "Crash Pillow" Gives All-Over Protection

A pneumatic safety cushion, intended to fill completely the spaces between aircraft seats within seconds in the event of a crash or forced landing, has been designed by Assen Jordanoff, pioneer flyer and aeronautical engineer.

The crash pillow, demonstrated to civil and military aviation authorities and at present under study at the Pentagon, is a rubberized nylon bag weighing less than two pounds, to be stowed, deflated, at the back of airplane seats. By pressing a single button, the pilot can inflate every cushion in the plane within three seconds.

The "inverted-L" shape of the big cushion places a resilient surface in front of every part of the passenger's body, keeping him in his seat and dissipating much of the impact of a forced landing. The natural buoyancy of the air-filled cushion is also pointed out as a safety factor in emergency landings in water.

The crash pillow will be put into production within a few months by Micro-Moisture Controls, Inc., Mineola, N. Y.

Some Glide Slope Failures May Not Show as Alarm

Further evidence that one of the greatest safety factors in aviation is pilot proficiency is given in the fact that failures may occur in the glide slope mechanism which do not result in a showing of the flag alarm. The safest thing in such a case is to know what may cause unmarked failures and to know how to cross-check for them before attempting an ILS approach.

Unmarked failures may arise from: a mechanical failure of the cross pointer indicator; failure in the wiring which connects the cross pointer indicator to the localizer and glide slope receivers; faulty receiver tube, which may result in an indicated broadening of the localizer or glide slope course; defective or failed components of the localizer or glide slope receiver course-forming units, which may produce a change in "on course" readings.

The safe thing is to check altimeter readings against glide slope readings when you are over the outer and middle markers inbound ILS.

Coffee in the Autopilot?

Flight Safety reports that a bolt apparently left behind by a mechanic worked its way through the floor of the cockpit and jammed the sprocket system which actuated the elevators.

On occasion, cockpit inspections have disclosed "front offices" as littered as bleachers after a ballgame. They have found papers and gum-wrappers in the corners, prop control assemblies soaked with coffee and autopilots doused in spilled milk. FSF points out that this isn't only sloppy, but dangerous: the solenoid points in a prop control may eventually arc if they are occasionally treated with coffee.

(Continued on page 36)

Tomorrow's Business Twin Today—the luxurious 5-place Cessna 310



Business fleets get new flexibility,
speed, economy with Cessna twins—
3 for the price of 1 converted transport



Pilots who have added Cessna 310s say:

Ray Mabe, Oman Construction Co.: "The Cessna 310 is showing itself to be the 'in-between' ship we were looking for—spreads out our fleet by getting into fields where bigger planes can't go; in fact, lands and takes off shorter than many single-engine makes, yet has more power per pound of weight than any other business twin."

Jack Ollom, The J. R. Watkins Co.: "It's a fun trip whenever I take the 310 up. It's the fastest, most dependable new twin I've seen. And that luxury cabin makes some of our execs prefer it for all trips. We flew our 310, 125 days out of 168 work days, accumulating 97,211 passenger miles with 96% on-time arrivals during the last 8 months—at a very low cost per mile."

Richard W. Smith, Champion Paper and Fibre Co.: "I've always liked big transports. At the same time we need smaller planes for flights with fewer passengers. We bought our first 310 and found it suited our needs—as a result we now have a second one. 310s add flexibility to our fleet and their cost per passenger mile encourages their use." SEE YOUR CESSNA DEALER (Yellow Pages of phone book) or write CESSNA AIRCRAFT CO., DEPT. S-4, Wichita, Kansas.



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maintenance

This department covers cost-cutting, time-saving methods and devices for maintaining industrial aircraft efficiency. Technical tips from engine, airframe, electronic, instrument and other components manufacturers, CAA and AD notices, and other sources will be covered. Readers are invited to share their individual mechanical "know-how" with SKYWAYS editors, that it may be disseminated to all operators interested in business flying.

Excerpts from CAA Airworthiness Directive

The modifications described below are mandatory, and if the information applies to your aircraft, it is not considered airworthy until the inspections and modifications have been complied with. If your plane is operated under progressive maintenance, "the local CAA agent is empowered to make reasonable adjustments in the intervals specified to allow compliance at an established inspection period."

"Directive 56-23-2, applies to all Wasp Jr. and Military R-985 series engines except those used in helicopters. Compliance required after every 75 hours of operation until next overhaul, when rework in 'B' must be accomplished.

"A.D. Note 54-22-2 was issued in order to avoid crankshaft cracking at the thrust nut threads and possible loss of the propeller while in flight. It has now been determined that in many cases the required rework has not been satisfactorily accomplished. In such cases the hazard still exists. Investigations revealed the required smooth blended radius of .010" was not incorporated in the bottom of the thread. We have known of cases where the propeller nut threads were erroneously reworked instead of the thrust nut threads.

"A. The following inspection of the crankshafts must be accomplished every 75 hours of operation until the crankshaft is reworked as noted in B:

- "1. Remove the propeller, thrust nut cover, nut, slinger and spacer.
- "2. Carefully clean the area to be inspected.
- "3. Using a dye penetrant and a 6 to 10 power optical glass, check for the presence of cracks. If any crack is found, the crankshaft must be replaced.

"Note: In the event of oil leakage in the front section of the engine during any operation, follow the inspection procedure described above.

"B. At overhaul the crankshaft is to be subjected to a special magnetic particle inspection procedure, shadow-graph inspection, and shot peening of the thrust bearing nut threaded area. Because of the special equipment involved, only certain activities will be able to accomplish this inspection and shot peening. Detailed instructions are available to qualified activities from 'Technical Supervisor, Service Dept., Pratt & Whitney Aircraft, E. Hartford 8, Conn.' The crankshaft is to be marked '14F-56' adjacent to the marking for 'SB1488' when inspected and reworked in accordance with these special instructions."

Hangar Loans Available to Fixed Base Operators

Flight school and air service operators can now borrow from the Small Business Administration for the construction of hangars, shops and classrooms, according to a recent announcement by James T. Pyle, Civil Aeronautics Administrator.

Provisions were worked out under existing SBA regulations for loans with or without local bank participation. Local bank participation must be secured if possible, in which event the interest rate charged by the bank of not less than 5% and not more than 6% will apply to the entire loan.

With no local bank participation, maximum SBA loan is \$250,000 at 6% annually. This can be increased by matching bank participation. Repayments may be spread over a maximum of 10 years.

One obstacle that flight operators have experienced in attempting to secure local financing for hangar construction is the reluctance of local banks to lend money on buildings to be erected on leased land. SBA will not object to making loans on this basis if the lease and other security meet SBA requirements. Flight operators must be able to establish reasonable financial worth and show adequate earning potential to qualify.

Assistance and advice on financial matters may be secured from SBA Regional and Branch Offices, which are located in all principal cities. CAA field organizations have been instructed to furnish all possible assistance to flight operators seeking such loans.

Winter Maintenance Notes

The *Aviation Mechanics Bulletin* for November-December has some very pertinent tips on winter maintenance.

1. "Park the aircraft with the tires resting on some kind of simple insulation. This will keep the tires from freezing to the surface.

2. "Use ice chocks if available, or use sandbags, but do not set the brakes. Taxiing can warm up brake parts enough to melt the snow that sifts in around them, and if the brakes are set when that moisture freezes, well!

3. "Tie down the aircraft for extreme wind conditions. If permanent tie-down rings are not available, coil the extra length of the mooring line into a hole in the ground as large as a 5-gallon can. Fill with water and let nature take its course.

4. "Use engine covers, but do not put them on until the engines have cooled enough so they will not cook the wiring insulation. A too-hurried instal-

New Pressure-Sensitive Tape Withstands 550° F.

A new line of pressure-sensitive tape, designed for a wide variety of aircraft applications involving wide temperature ranges, is soon to be available from Mystik Adhesive Products, Inc.

Mystik tape is said to have great strength because it is made of tightly-woven high-tensile glass cloth backing and silicone adhesive. Adhesive and tensile strength is retained through a very wide temperature range, so that the tape is suitable for insulation and sealing as well as holding.

Mystik #7000-G, which has been tested and approved by the U.S. Navy Bureau of Ships, may be used in temperatures from -100° to 550°F. With Fiberglass backing, it is said to have good thermal and electrical qualities which make it suitable for many uses not previously possible with tape.

With adhesive on both sides, #7100-G has the same physical characteristics and temperature range as #7000-G.

A "super-thin" tape with Mylar film backing is also to be offered as #7300. Useful between -80° to 325°F., the Mylar tape offers high tensile and dielectric strength, and is non-corrosive with copper, aluminum or silver conductors.

Sinclair Oil in New Quart Size

Sinclair Refining Co. has recently made available in individual quart cans the aircraft oil used for 23 years by American Airlines and since 1949 by Eastern Air Lines. The new quart size is ideal for maintenance bases servicing small business aircraft.

The low temperature fluidity of Sinclair aircraft oil, its high film strength and chemical stability provide high horsepower output for climb and for single-engine operation. It also serves as a seal for the piston rings and as a major coolant.

Sinclair Oil in quart cans is available in Aviation Grades 65, 80, 100, and 120 (SAE Numbers 30, 40, 50, 60; A-N Symbols 1065, 1080, 1100, 1120).

lation also tends to create condensation in the spark plug and ignition systems.

5. "Use wing covers. They are heavy and hard to handle in a wind, but they do keep frost, snow and ice from sticking to the surfaces.

6. "Keep a close check on oil sumps. If there is moisture present, the oil should be changed.

7. "Check hose clamps for proper torque. The unequal contraction of metal nipples and tubing under extreme conditions may produce leaks.

8. "Baby the batteries. Store them in a heated place whenever possible. Once batteries have been cold soaked they should be warmed before using. Cold batteries have a low output and the charging rate is very slow. The charging rate at -20°F is less than one half that at normal temperature.

"Partially charged batteries will freeze in low temperatures. The following table shows the freezing point of batteries at various specific gravities:

Spec. Grav.	Freezing Temp.
1.000	32°F
1.050	26°F
1.100	18°F
1.150	5°F
1.200	-17°F
1.250	-61°F
1.300	-95°F

"If the specific gravity is below 1.150 the battery should be put on the charging line. Never add water to a battery unless you put it on the charging line to make sure that the acid is mixed with the water. Watch the generator voltage for adequate input.

9. "Take care of you! Wear proper clothing, including footwear and mittens. Guard against perspiring; watch out for frostbite and lung frosting.

10. "Curl up with a good book, the company manual. Review carefully all it says about cold weather operating procedures, including: oil dilution; cold engine starts; use of carburetor heat; operation and maintenance of aircraft engine heaters; removal of ice and frost from aircraft surfaces; cold weather operation of oil pressure gauges; proper handling of auxiliary equipment."

Exhaust Track Stain Remover

A new aircraft exhaust track stain remover, now undergoing operational tests by the Air Force, has proved successful in removing oil, grease and general soil from painted and bare metal and plastic surfaces of aircraft. It is also reported to have no adverse effects on glass-cloth or cotton fabric aircraft covering.

"Octagon 470" is described as non-inflammable, non-toxic and non-irritating. Produced to Air Force specifications, the new cleaner is harmless to fish or animal life, avoiding the problem posed by kerosene-based cleaners of how to dispose of waste.

Application may be made by spraying or wiping on a cold solution of Octagon 470. A cold-water rinse washes away loosened particles. It is available from stock in 54-gal. and 5-gal. drums, and in 1-gal. case lots of 6 to a case.

... in the business hangar

■ PacAero Engineering Corp., Santa Monica, has completed Learstar empennage conversion, including rudder and elevator spring tabs, retractable tail wheel, angle of incidence change and empennage beef-up on the Michigan Tool Lodestar, Paul Holst, Chief Pilot. □ Conversion was completed on the Chance Vought Learstar to increase gross weight from 225 to 25,000. Al Brill is Chief Pilot. □ Clare Kingsbury, Warren Petroleum's Director of Aviation, took delivery of the Warren plane after conversion to Learstar Mk II and installation of new radio system. □ Minnesota Mining & Mfg. Lodestar is at PacAero for conversion to Learstar II. Don Richardson is 3M Chief Pilot. □ Custom paint job has been completed on the E18 Beech owned by Lear Inc., Grand Rapids.

■ Remmert-Werner □ Oklahoma Pipe Line Constructors' Super-92 DC-3 came to R-W for a double engine change, Gordon Koonce is Pilot. □ Ken Colthorpe and Chris Chaffee of Champion Spark Plug, and Larry Lyons of Denison Engrg. took advantage of the NBAA Forum in Miami to have 100-hour inspections and other maintenance done on their DC-3's at R-W's new Pompano Beach facility. □ Neil Fulton and Bill Hoban brought the Olin Mathieson DC-3 N3X to R-W St. Louis for installation of Bendix X-band radar, with hinged radome, swingaway scanner, Bendix 1518 inverter, new instrument panel with Grimes eyebrow lights, Collins 51R3 omni, Aerojet Jato emergency rockets, new interior, 100-hour inspection and major overhaul. □ Skip Wittner was at R-W Pompano Beach for 2000-hour inspection of the Kewanee Oil Super-92 DC-3.

■ Van's Air Service, Winona, Minn., completed work on these NBAA business planes: 100-hour inspection, radio repairs and installation, and misc. improvements on Lodestar owned by Giddings-Lewis Co., Doug Lionberger, Pilot; Aero Commander owned by Ray-O-Vac Co., Bill Allen, Pilot; DC-3 and Cessna 310 owned by J. R. Watkins Co., Jack Ollum, Chief Pilot; Aero Commander owned by General Mills, Bill Stone, Pilot. □ Engine major, new radio installation, and paint job completed on the Navion owned by DeKalk Agricultural Assn., Hugh McCorkle, Chief Pilot; also general maintenance on DeKalb Aero Commander. □ 100-hour inspections were completed on NBAA member Ray-O-Vac Co.'s Aero Commander, Bill Allen, Pilot; J. R. Watkins' Cessna 310; MacDonald Construction Co.'s Aero Commander; Halvorson Trees' Aero Commander. □ Complete interior installations have been concluded by Van's on the Navions owned by: Leck Construction Co., Saul Motor Co., and the H. J. Bruntjen Co., together with engine majors, annual inspections and repainting.

■ AiResearch Div. □ A Convair 440, owned by General Dynamics Corp., is receiving from AiResearch a complete custom executive interior, RCA AVQ-10 radar system, auxiliary fuel tank system in the outer wing panels to hold an additional 350 gallons, dual integrated instrument system, Sperry engine analyzer, and a custom designed exterior paint job. □ Bob Ferguson, Manager of Ford Motor Co.'s Air Transportation Dept., accompanied their DC-3 to

AiResearch for a double engine change from P&W 1830-92's to 1830-94's, installation of RCA AVQ-10 radar system, and the AiResearch modified rudder boost tab.

□ On a return visit to the AiResearch Hanger, Pilot Larry Harder and Co-Pilot Ken Brunkow flew in the Ladish Co.'s DC-3 for a double engine change, 100-hour inspection and installation of the AiResearch Maximizer Exhaust System. □ A custom interior, auxiliary power unit and other items are on tap for Texas Oil Executive John Mecom's Convair 440.

□ Ford Motor Co.'s Convair 440 is to receive a complete custom executive interior at AiResearch, will have engine analyzer and integrated flight system installed.

■ Bayaire Avionics, Oakland, has completed modification of Utah Const. Co.'s Mk.III Learstar, including Aero-Com Star-Atom HF system, two ARC ADF-21's, a new edge-lighted overhead panel, Sperry H-5 horizon, Omni-mag, and RMI addition to Collins Omni. Doug Garneau is Pilot. □ Installation in Kaiser Co.'s Beech E-18S, Jess Mosher, Pilot, included 51X-1A/17L-6 communication, 51R-3, ARC CD-1 Course Director, ARC ADF-21, and a new edge-lighted radio centered in instrument panel.

■ Bayaire Avionics □ Pilot Rene St. Pierre flew Standard Oil's Piper Apache to Bayaire for installation of ARC 15D/CD-1 and Type 21 ADF, Flite-Tronics CA-1 amplifier and MB-3 marker beacon receiver, and Narco 1016 Communications Units.

□ A Collins 51V-2, two ARC omnis and an ARC T-20 transmitter, MB-3 Flite-Tronics and a Lear Autopilot were installed in the Twin Beech operated by Oregon Steel Mills. Larry Hill is Oregon Chief Pilot.

□ Ronnie Baccus flew Specially Union's Lodestar to Bayaire for installation of ARC ADF-21. □ Thatcher Glass Co.'s PV-1, Torch Lewis, Pilot, was in for maintenance work and had Collins 37X-1 antenna installed. □ The Cessna 310 from Blackfield Constructors Co. had Lear LTRA6, LVTR-36, ADF-12 and Flite-Tronics MB-3 installed by Bayaire Avionics. Bob Dolan is Blackfield Pilot.

■ Pacific Airmotive □ Republic Supply's Aero Commander, with Harry Conover and Jim Keegan aboard, is in the air again after a 100-hour inspection by PAC. □ Wells Cargo Chief Pilot Ivan Nelson, Las Vegas, brought his company's Twin Beech into PAC-Burbank for a 100-hour inspection. □ Relicense and 100-hour inspection is being performed in PAC's Burbank shops on Monterey Oil's luxurious converted PBV. □ Turn-around maintenance at PAC recently included Swiflite's 440, with H. K. Baird and George Pennington aboard, as well as Sinclair Oil's Lodestar, brought in by Pilot Al Minich. □ The Guy L. Waggoner Estate Lodestar has returned to its Phoenix base following completion of tank repairs, windshield replacement by PAC's Burbank Aircraft Div. Bill Eyster is captain.

■ Southwest Airmotive □ Lockheed Pilot Jack Norton and Mechanic Bud Parsons brought the Lodestar in for 100-hour inspection. □ Famed portrait photographer Lester Henderson brought his Cessna 195 to Southwest for 100-hour inspection.

(Continued on page 38)

General News

Eastman Buys Second DC-3, Plans to Build New Hangar

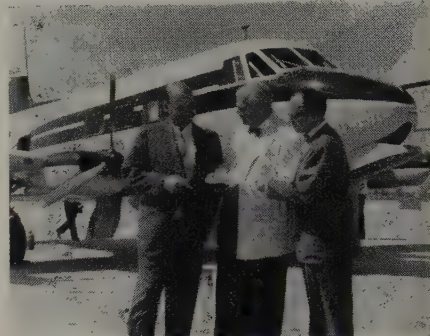
NBAA member Eastman Kodak Co., Rochester, N.Y., recently purchased its second DC-3 for executive transportation. Eastman's original DC-3 is based at Rochester. The second one will be based at Kingsport, Tenn., site of the Tennessee Eastman Div., and will be used primarily for contact between Kingsport and the Texas Eastman Div., Longview, Tex.

Eastman has also announced details of its plan to construct a hangar at

Rochester-Monroe Co. Airport, the first such project at the field in 10 years.

Kodak has leased 95,873 square feet of land for the 2-plane hangar, including a taxiway strip, a driveway from the highway, a hangar apron and a parking space for about 12 cars. The proposed lease is for 25 years at an annual rental of \$2,437.36.

Kodak plans to construct an all-steel hangar 120' square and 32' high. A 16 x 120' section will provide space for a combination office and waiting room, rest rooms, shop facilities, storage and heating equipment.



JIM HERRICK and GUY MILLER discuss with **Herb Fisher** the aspects of Cessna's 620 which show great possibilities for the corporate market. Most attractive features are reported to be the plane's four engines, pressurization, and top speed of 282 mph. Fisher looks forward to making a test flight for SKYWAYS at the earliest opportunity.



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The "Flying Circus" Idea Is Crippling Business Aviation

"Corporate flying today comprises more than 50% of all flying. Corporation planes flew 3,200,000 more air miles in the U.S. in 1955 than all domestic airlines combined. You know this, but who else does?—certainly not enough of the people who can do something about the private airport land situation."

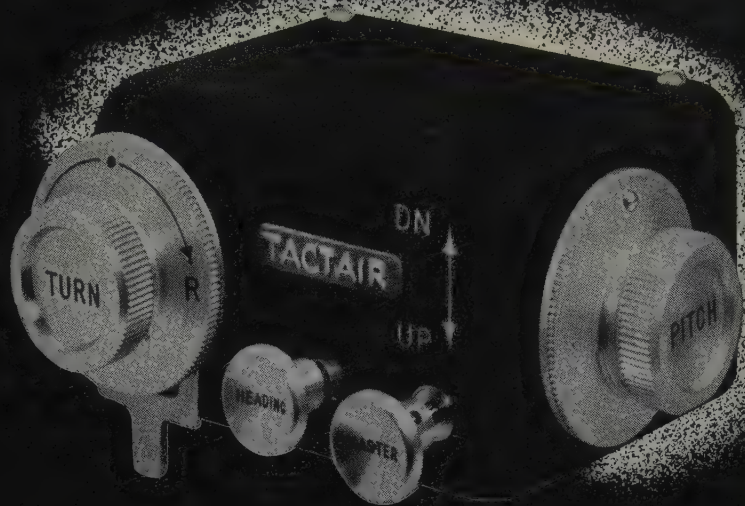
This idea, and its prevalence in the public, was discussed in a speech by Paul H. Faltysek before the annual meeting of Piper distributors of Ill. and Wis. Mr. Faltysek is V.P. of Livingstone Assoc., public relations counselors for Tufts, Edcumbe, Inc., Piper distributor in that area.

Mr. Faltysek's main argument was that the real value of business aviation is obscured by the outdated but popular idea that flying, unless it is needed for national defense, is simply an extravagant and dangerous kind of sport. This attitude, what Mr. Faltysek calls "the flying circus school of thought," is encouraged by the sensational treatment given by the press to any kind of airplane accident: "The crash of one small plane often gets about the same attention as the Johnstown Flood." As further example of a general non-acceptance of aviation, even military airports have been censured by some communities.

The speaker emphasized that business aviation must educate the public to its purposes and values, and so "to earn public understanding and acceptance, to deglamorize private flying and present it in its true light." He pointed to aviation underwriters as an example of the results of good air-age education: "Even the most conservative life insurance companies are relaxing their under writing rules for insuring private pilots and their passengers."

The result of the public attitude toward business aviation has resulted in a continual diminution of the space available for airports.

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Advance in Autopilot
For Business Aircraft
Since the Invention of
Automatic Flight Itself*



Compact command control mounts conveniently on throttle quadrant or panel

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- * **Pneumatically operated —**
no motors, no tubes, no warm-up, no power drain
- * **Less than 10 pounds total installed weight**

THE OUTCOME OF THREE YEARS' RESEARCH WORK on automatic flight for the U. S. Navy, the Tactair T-3 three-directional autopilot is now offered, fully proven, fully flight tested, for business aircraft.

The Tactair T-3 completely revolutionizes the concept of performance, accuracy, light weight and reliability for automatic flight in business airplanes. It operates pneumatically from the aircraft's vacuum system — no additional pump needed. It involves no motors, no tubes, no warm-up, no power drain. Powerful pneumatic "muscles"

do the job smoothly, effortlessly, with no complicated follow-up systems, no constantly working clutches.

The result: unprecedented accuracy, unmatched smoothness, reliability and weight-saving — only 7.3 pounds. Total cost including installation kit, \$2,395.

The Tactair T-3 autopilot is manufactured and backed by Aircraft Products Company, whose engineering and precision manufacturing techniques have overcome some of the toughest hydraulic and pneumatic system problems for major jet aircraft manufacturers.

EXCLUSIVE HEADING LOCK AND HEADING MEMORY

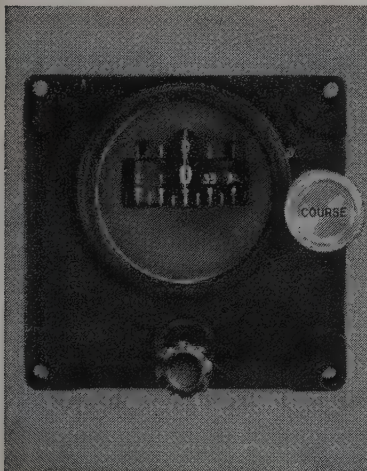
The Tactair T-3 automatic pilot holds any compass course to the exact degree desired — an inestimable advantage in flying VOR or ILS localizer track.

It's done by Tactair's exclusive heading selector incorporated into a standard directional gyro. If you wish to fly a course of, say, 312° you set the upper course card to 312°. Engage the heading lock button and the Tactair T-3 automatically turns the airplane to a 312° heading. From then on, it stays on the gyro heading, locked to the exact degree. If you turn the airplane manually from the preset heading, then release the controls, it returns automatically to 312°, thanks to Tactair's exclusive heading memory.

If you wish to alter course, to correct for wind drift on VOR or ILS track for instance, merely reset the gyro course selector to the desired new heading.

Three-axis control sensing is derived from ingeniously modified directional gyro and artificial horizon, supplied with each installation kit. Directional control is sensed from the DG, pitch and roll from the horizon. The sensing units have no mechanical or electrical contact with the basic gyro instruments, thereby eliminating any adverse effect on gyro operation.

Turns up to standard 3° per second are made automatically by moving the "Turn" knob on the face of the command control.

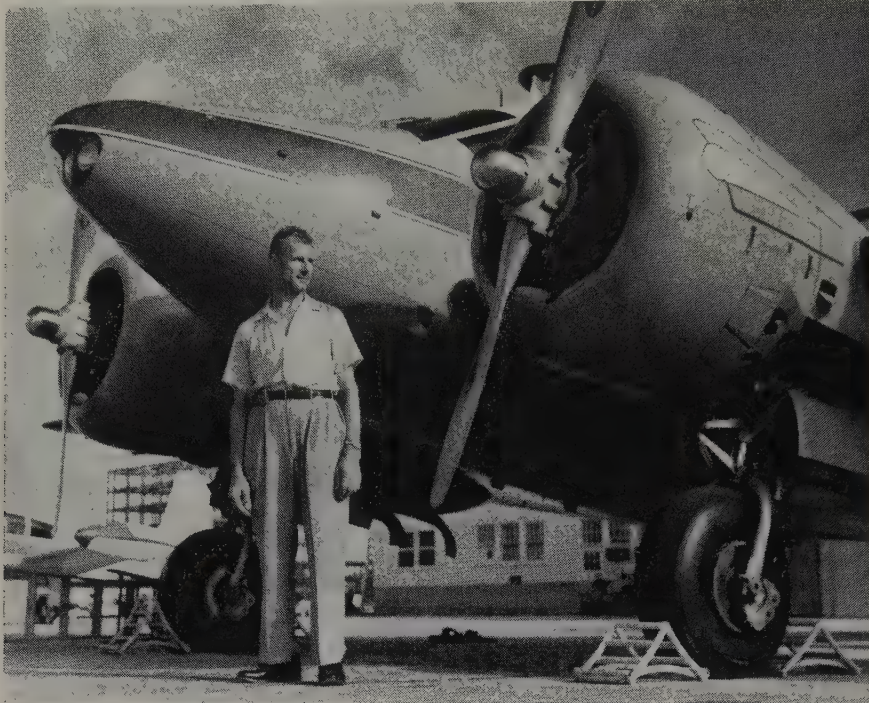


WRITE FOR COMPLETE DESCRIPTIVE BROCHURE

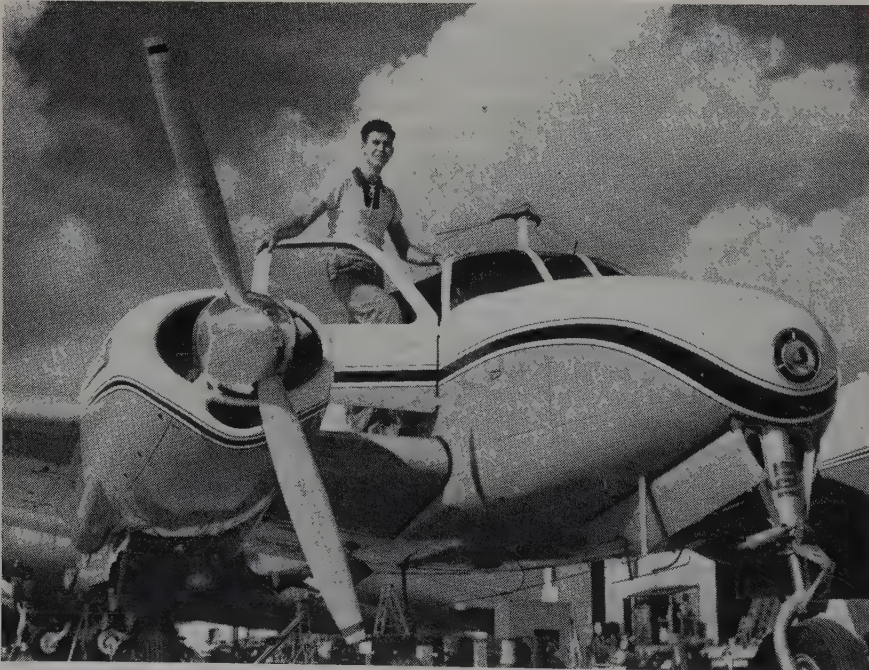
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AIRCRAFT PRODUCTS CO.
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FOR 16 YEARS SPECIALISTS IN PRECISION AIRCRAFT PNEUMATIC AND HYDRAULIC CONTROLS



RATNER MFG. CO., NBAA member, Chicago, uses this Beech Super 18, piloted by Harry Johnson, to coordinate its farflung real estate interests throughout the state of Florida and the Caribbean islands. Named "Lucky Lee" after company President Lee Ratner, the 7-place Beech has Collins radio, dual Collins omni, Collins ILS and ADF, as well as auxiliary ARC transmitter and receiver. Radio equipment is installed in the nose for space economy and easy maintenance. Based at North Perry airport the plane makes the trip from Miami to Tallahassee in two hours and ten minutes, providing ample time for business transactions in any city in the state within a regular working day.



AN ESSENTIAL TOOL in the island-hopping construction work by McDonough Construction Co., Miami, this Twin Bonanza, flown by William Kerwood, is kept busy around the clock hauling engineering personnel and vital machinery parts between the mainland and bases in the Bahamas and Caribbean islands. One important phase in the operation of the company-owned plane has been the transportation of sick personnel from the tropical islands to the States, for which the air-conditioned Twin Bonanza is especially suitable.

Sylvania DC-3 Gets Collins AP-101

The DC-3 executive transport operated by Sylvania Electric is the first business plane of its type to incorporate the new Collins AP-101 autopilot.

Principal advantages of the AP-101, which is designed to tie in with the Integrated Flight System, include the use of only two instruments to give complete monitoring of the automatic system, smooth flight control by a "fader" and hysteresis clutches, increased reliability and negligible heat output through the use of magnetic amplifiers and silicon transistors, and easy maintenance through the use of module plug-in subassemblies in the computer and amplifier.

Installation by Garrett Corp.'s AiResearch Aviation Service Div., Los Angeles. Pilot Rod Elliott is reported well pleased with the results.

New Lights for Newark, Idlewild

New York International and Newark Airport, two of the country's busiest ports, will brighten up this spring with the addition of new columnar fluorescent lights on the taxiways.

Ten inches in diameter and two feet high, the lights will be spaced about 200 feet apart on straight sections, closer together on curves. Comprising blue columnar plastic globes containing slimline fluorescent lamps, they will present a larger and more characteristic outline to the pilot than the present incandescent "pinpoints."

The new lights were developed by Edward Ingraham, Manager of LaGuardia Airport, in conjunction with Port Authority engineers. Purchase of 1129 lights has been authorized, at a cost of \$40,531.

A saving of about \$16,000 a year is expected, since the fluorescent fixtures will consume about half the power required for standard incandescent lamps, and will require replacement about once in three years as compared with once in 3½ months.

The lamps are produced under special contract by Steiner Universal Co., Glen Cove, N. Y. Information on use of the lights for other installations is available from the Aviation Planning Div. of the Port Authority, N.Y.C.

New Plant for Western Gear

Western Gear Corp., producer of such diversified equipment as aircraft control systems, marine reduction gears, and printing presses, has opened a new Engineering Building in Lynwood, Cal.

The new structure cost more than \$500,000, and accommodates more than 250 engineers. Western Gear, founded in 1888, is one of the largest producers of special machinery in the U.S.

Company President Tom Bannan officiated at the ceremony marking the opening of the new facility, attended also by Mayor Bob Compton, Lynwood.

Business Aircraft Need Produces New Airport

According to Edmund G. Mason, president of the Chamber of Commerce, Olean, N. Y., their new municipal airport will have the distinction of being the second in New York State to be built by a municipality primarily for business aircraft. Olean will pay half the costs and the Federal government the remainder. The airport moved a step nearer realization this month when the CAA announced approval of the site, 400 acres 9.9 miles from the city. The approval followed allocation of \$500,000 to cover the first two of the three-stage project.

Through study it was learned that the existing airstrip does not and could not meet the needs of industry. Seven companies with branches in Olean cannot use the existing airport because of the size of planes they operate. It also was found that 14 local industries had 281 customers whose company planes could not use the local airport.

The study committee concluded that it was essential to provide an adequate airport to retain existing industries and attract new ones.

Recommendations were made to the Olean Common Council, and representatives of the CAA and the New York State Bureau of Aviation were called in for assistance with site locations, planning and application for federal aid.

The master plan calls for development in three stages, the first to be completed in 1957, the second in 1958 and the final stage in 1960.

The first stage will include acquisition of the land, construction of a 3800-foot paved runway, taxiway, parking apron and access road, lighting and turfing. The runway will be extended to 4400 feet in the second stage and an administration building erected. In 1960, it is planned again to extend the runway to 5000 feet.

Local industries have very actively supported the airport program by providing funds for options to purchase the airport property, lending personnel up to full time participation in planning, and providing planes for site inspection and transportation of officials.

The Airport Committee further points out that local industry will provide income necessary to operate the new field by leasing land, the purchase of gas and oil and attracting customer aircraft to the area. And, together with business, it is expected to pay 50 percent of the taxes on the airport.

A publicity program was conducted in connection with the project, informing the public of the benefits to be realized by every resident of the area, the reasons the old airport was unsuitable, and the costs to the taxpayers.

The new runway will be long enough for planes that local service airlines are now flying. Mohawk Airlines has made application to serve Olean.



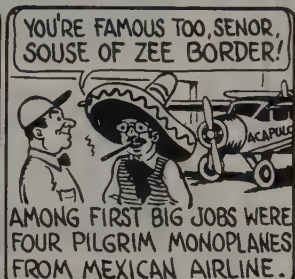
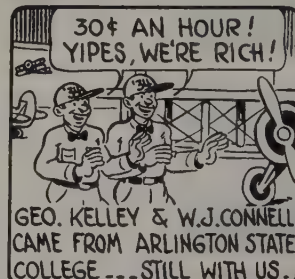
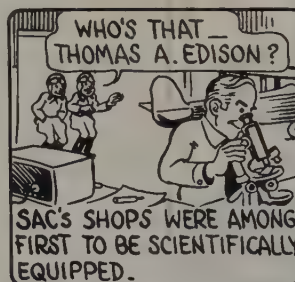
SAC



Men, Moxey & Machines

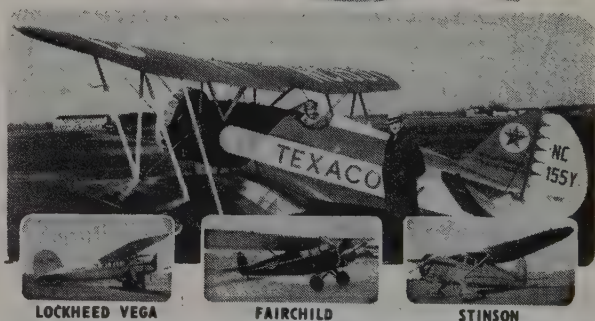
Silver Jubilee Newsreel

by JACK PATTON



Old Friends .. New Concepts

A salute to three old friends: Hal Henning (cockpit), Maj. W. F. Long (standing), and The Texas Company! Henning flew this Texaco Waco when, in late '33, he joined Doc Booth as partner. Today, SAC—Booth-Henning's offspring—and Texaco still are close co-workers in business aviation. Bill Long is our good neighbor, and Hal Henning is the much-admired chief of GMC air transport ops, Detroit.



LOCKHEED VEGA

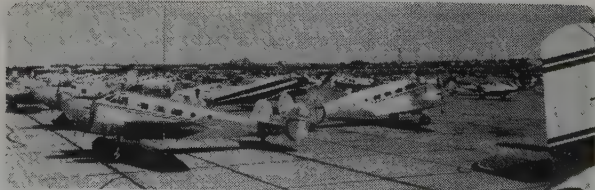
FAIRCHILD

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New Friends .. Old Traditions

Booth-Henning began the SAC tradition of versatility in top-quality service for anything with wings, such as the early business planes seen above. For business flying, the military, and the airlines, quality and versatility remain synonymous with Southwest Airmotive. Here's a typical modern ramp scene.



Southwest Airmotive Co.

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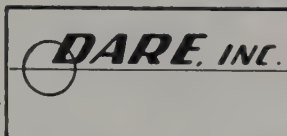
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General News

Hot Fuel Prime and Deaerating Oil

The top of the world and the bottom of the world are awfully cold places. Too cold for the average person, used to temperate climes to conceive. Comparatively few people on this globe have ever experienced temperatures far below zero. You possibly remember the day when your thermometer went down to 17—maybe to 20 degrees below zero. You remember, then, of sitting in your airplane shivering while your starter labored to turn over an engine while you cursed yourself for not using more dilution the night before. If you were fortunate, you got one engine started and eventually the other, then got up a little cabin heat. Operators of corporation aircraft based in the northern mid-west and western states are only too familiar with this problem.

Imagine then, military aircraft in the extreme cold ranges; in the Arctic and the Antarctic circles. The temperature is down to 65 or 70 degrees below zero, and the planes have been sitting out in these temperatures long enough to become thoroughly chilled. The cold penetrates into the heart of the craft in a matter of a few hours—after that—it is in a condition of "Cold Soak," a period beyond which no part of the craft can get any colder. Every part of the craft has reached the ambient, or surrounding temperature.

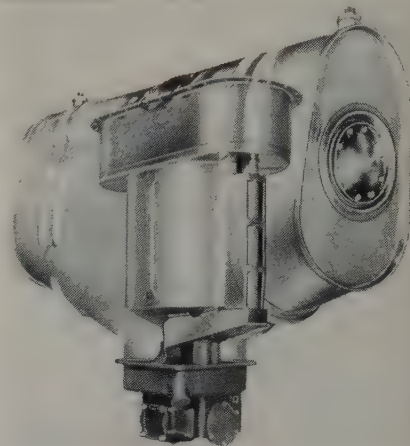
The engines won't turn over because working parts are buried in oil that has become solid with cold, oil that is brittle enough to chip with a hammer. The fuel is too cold to ignite readily. The whole airplane might just as well be made of ice; only the doors and the knobs and the switches operate. The ship itself, with frozen power, is dead.

The First area to be tackled by the military to unfreeze "dead" airplanes was Alaska. Tons of pre-heating carts and all the equipment that is essential to the operation of getting heat through cold metal and into the heart of the engines were flown in. Ground crews were supplied to rig the canvas tents over the engines, route the hot air ducts and operate the heating carts. And so, engine oil was eventually thawed to a flow temperature, and after a matter of hours, it was possible to turn on the juice and start the engines preparatory to take-off.

The Arctic Circle has developed into one of our most important areas of perimeter defense. Military aircraft, stationed within this area constitutes our first line of defense-interception of enemy aircraft. D E W (defense early warning) demands that interceptor craft must be in the air within the time limit allowed by the radar warning fence. It may be essential that ground personnel be evacuated from advanced bases immediately upon getting fighter craft in the air. This would be a function of troop and cargo carriers. To accomplish these ends, United Aircraft Products, Inc., of Dayton, Ohio, started the development of a system that would provide for a constant reservoir of fluid

engine oil regardless of ambient temperatures. Paralleling this effort was the development of the Hot Fuel Prime System for the preheating of engine fuels in extremely low temperatures.

With the installation of these two systems as standard equipment for aircraft that were to fly in and out of sub-zero weather, with the cold-soak factor entering into most flights, often without hangar facilities, engine starts are attained in less than 2 min. with the Hot Fuel Prime System and takeoff time reduced from the 3 to 6 hour requirement to under 30 min. with the Deaerating Cold Weather Oil System.



PHANTOM view of the Deaerating Cold Weather Oil System in a typical installation within an airframe-mounted oil tank. The system includes a hopper, flange mounting and diverter-segregator valve.

All of this has been accomplished with the negligible additions of approximately 10 pounds per engine for the Hot Fuel Prime System and 12 pounds per engine for the Deaerating Cold Weather Oil System.

The UAP system has been standard equipment on the Army Workhorse H-21 Piasecki Helicopter, the SA-16 Gruman Arctic Rescue Aircraft and the C-123 Fairchild Cargo Airplane. The Deaerating Cold Weather Oil System, being completely self-contained, permits aircraft to operate in subzero conditions without hangars, service docks, heating equipment or servicing crews. This facility of operation makes it very acceptable to commercial operators whose aircraft are often laid over away from home base at locations where hangar storage is not available.

The expenditure of huge totals of time and money by UAP that has gone into the development and perfection of the Cold Weather Oil System has been well justified despite the original gamble of obtaining acceptance even though the system would be proved. According to Edward L. Ladd, President of UAP, they are furnishing Deaerating Cold Weather Oil System designs to airline operators for retrofitting of operating aircraft and ground equipment as well as to airframe manufacturers as original equipment.

General News

The UAP Hot Fuel Prime System is applicable to all piston type aircraft engines whether airframe mounted or installed in ground units. Fuel, while not subject to the hard-freeze characteristics of engine oil, can use a heat boost for faster ignition. The UAP Hot Fuel Prime System preheats the fuel before it reaches the engine by the use of a resistance type element enclosed in a separate tank system and controlled by an Electronic relay system. This operation will raise the temperature of the fuel from a low of -65°F to above 200°F in two minutes.

Piper Sales Up 49% in 1956

Gross sales of the Piper Aircraft Corp. increased 49% during the 1956 fiscal year, which ended September 30, according to an announcement by W. T. Piper, company president.

Mr. Piper indicated that most of the improvement could be attributed to the popularity of the Piper Apache, which accounted for about 40% of the company's dollar volume. Apache sales improved over the previous year by 59%—about \$4 million. The Apache represented 44% of all light twins sold in the U.S.

"Development work has gone forward on an improved airplane for agricultural purposes," Mr. Piper said, "and plans are being made to substantially

expand engineering and experimental research and development."

The company's annual report shows gross sales of \$25,084,000, and net earnings, after taxes, of \$2,554,000, compared to gross sales of \$16,813,000 and earnings of \$1,401,000 for 1955.

New Sperry Plant at Phoenix

The Sperry Phoenix Co., initial manufacturing facility of Sperry Rand Corp., is under construction on a 480-acre site at Deer Valley, near Phoenix, Ariz.

An 81,000 square foot plant unit, which will cost about \$3 million to build and equip, is expected to be completed and in operation by August, 1957, according to company officials.

Initial production at Sperry Phoenix will be components for flight control systems, autopilots and engine control systems for turbine and jet business, commercial and military aircraft. Subsequent production will include instrumentation for various types of piston-driven business aircraft.

According to a statement by Herbert C. Bostwick, Division Manager, Sperry Phoenix was planned "against the probability of an early expansion of our initial operations," and in line with this policy operations have already begun in 14,000 square feet of leased space at the Arizona State Fair Grounds. Regular employment recruiting will begin later this year.

Increasing Hangar Facilities At Oakland International

Plans to build 24 executive- and light-plane hangars at Oakland International Airport at a cost of over \$200,000 have been approved by the Oakland Board of Port Commissioners.

Dudley Frost, general manager of the Port, said there would be 20 standard size hangars and four suitable for twin-engine corporate planes. He added that, in the area selected, adjacent to the north end of the north-south runway, there is space for the ultimate construction of 300 standard and executive hangars. A recent survey indicated an immediate need and assured rental for the first 24 hangars. Included in the small-plane area will be a facility for washing aircraft.

Construction of the hangars is part of the current \$15 million expansion of the airport, which will include a new runway and terminal building a mile out in the Bay. Dredge-filling of the area is now under way; when the new runway is completed, it is expected that existing runways will be used more extensively by corporate planes.

Recent trends in population distribution have placed Oakland International in a more nearly central position, and restaurant and motel facilities are planned to increase the accessibility of the "industrial park" planned nearby.

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NEW PURCHASE LEASEBACK FINANCING

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3. Conditional sales contract purchases.

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If you are operating on limited working capital, restricting expansion of your operation, Standard's Creditaire Division will finance the purchase of new equipment, then lease it back to you. Lease charges are income tax deductible.

You can, if you wish, initiate a continuous replacement program by selling your old aircraft and acquiring new. Standard will finance the sale of the older equipment to other airlines on a "pay out of profits" plan, and finance the purchase of your new equipment for you on a leaseback arrangement or under a conditional sales contract.

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Safety Exchange

(Continued from page 26)

In the Jump Seat

Some of our top-notch business pilots take us along and share the sweat AND the fun! Our contributor this month is Torch Lewis, ace throttle-jockey of Thatcher Glass Co's Lockheed Ventura. May we come along with you?

St. Louis

What would a visit to STL be unless you were greeted with the big grin of that personable Paisan Skip Dugo of Remmert-Werner? He has the inestimable quality of making you feel genuinely welcome, and is a good salesman to boot.

Ralph Piper told us about the new Holiday Inn, which is one mile from the airport on Route 66. Has restaurant, gin mill, swimming pool (and a manager who is a character) right on the premises. We were most pleased.

Phoenix

Sky Harbor, Phoenix, has the highest control tower and the dustiest airport in the U.S.—but a cleaning service is available. Service is commendable.

Our people stayed at the Arizona Biltmore, a large gray stone mausoleum surrounded by individual crypts which they permit you to occupy for one pint of blood and half a yard of the green per diem. We selected a small guest lodge, called it El Estribo, which is short on action but long on hospitality.

Las Vegas

Flew in shortly behind a TWA 404 which was operating on one fan. The 404 landed long, tried a single engine go-around. No soap, landed gear up in the desert. Thirty-eight passengers aboard, no one badly hurt. One interesting facet: the 404 touched down in the soft sand, skidded sidewise, and decelerated from flying speed to a complete stop in 130 feet!

Ah, Lost Wages, Nevada, where one can gamble and gambol 24 hours every day. Nothing ever closes, and every night is New Year's Eve. Entertainment is fabulous, cheap and plentiful. Ella Fitzgerald, Lena Horne, Liberace.

As we were walking by the gaming tables in the New Frontier, where Ella Fitzgerald was holding forth, this big gorilla said to his girl friend, "Gimme da money I toldja not to gimme."

George Crockett's Alamo Airways at McCarran Field has one of the sharpest crews in the business. Four minutes after we taxied onto the ramp, our passengers were on their way into Las Vegas in a rented car, our gas order had been taken, and we had two quarters going in the one armed bandits.

Met Hal Curtis, Doc Mosher and Charley Hascup of National Distillers' B-23, who RON'd. They are anxiously awaiting their superb Ventura.

Breakfasted with TWA jockeys Art

Murphy and Larry DeSalle, who were investigating the 404 accident.

San Francisco

ATC finally made a boo-boo. We filed IFR to San Francisco from Las Vegas, requesting lowest available altitude. We were assigned 10,000—the minimum en route altitude being 12,000 (from Palm-dale to Coalinga). We weren't unduly concerned about running into any formations of cumulus granite, as the weather was CAVU, so we stayed at 10,000 all the way.

Dinner at Trader Vic's and a visit to Oakland Airmotive, who know a great deal about putting a Lodestar together. Wes Fielding, of Bayaire Avionics got our marker beacon in good order.

Los Angeles

Smogville was in its best gray clothes, with visibility at minimums, much of this caused by a forest fire at San Berdu. One of the hardest working pilots fighting this fire was Cal Ferris, Chief Pilot, U.S. Forestry Service. This organization flew 8000 hours in 1955 in their Lockheed, Twin Beech, helicopter Bonanza type aircraft.

Charley Potter, of Potter Aircraft Service, and one of aviation's nicest guys, sent us over to On Mark Engineering, in Glendale, to see the new Douglas B-26 conversion. Met by Bob Denny and Mike Keatly of On Mark. Superior Oil has a B-26 going through conversion. Features air-stair side entering door, tip tanks, greatly enlarged cabin, both lengthwise and vertically.

Bob and Mike showed us blueprints of a pressurized turboprop 14-place executive transport (cruise 450 at 30,000) they plan to build next year.

Back at Burbank, we sweated out a Great Lakes DC-4 who couldn't get a green light on right gear. They came in, made a beautiful one-wheel touchdown without incident.

Met nice guy Ted Lawson—*Thirty Seconds Over Tokyo*. Also met D. S. Malmberg of B. F. Goodrich Aeronautical Sales, who vehemently insists that our findings at the Miami Radar Forum relative to icing on radomes are all wet. Will report in detail next month.

It is not news that Lockheed's Herman "Fish" Salmon bailed out of an F-104 over the desert a few months ago. At 40,000' Fish developed some real troubles. By 20,000' Fish decided he didn't have a nickel in the machine, so he pulled the string, and landed 50 miles from the nearest gopher hole. It is a tribute to Fish's popularity that within two hours 100 planes, mostly friends of Fish, were searching for him.

They found Fish unscaled, and took him for his first helicopter ride to Twenty-Nine Palms, where he called Lockheed and said he wasn't coming home until they sent a DC-3 for him. Which they did!

Tulsa

Good night's rest at the Mayo. Paid for all the CAVU weather for the last two weeks—solid IFR to Elmira plus rime icing. Home sweet home!

Took one more flight before having appendix removed sudden like.

See you right here next month.

Near Miss

Aircraft N5801C, a Beechcraft Bonanza used exclusively for business, departed from Port Columbus Airport, Columbus, O., at 1130, July 25, 1956 on a VFR Flight plane to Alton, Ill. There were no passengers aboard.

The flight was routine until approximately 1405 when it passed over the Vandalia, Ill., Omni Station on course at 10,000 ft., on a heading 264° Magnetic.

Approximately 30 seconds after passing the Omni Station, 5801C was overtaken by TWA Flight 95, inbound to St. Louis. TWA 95 was also flying at 10,000 ft. on approximately the same heading as 5801C. This aircraft, a Constellation, passed approximately 50 ft. to the left of 5801C converging slightly so as to cross 5801's nose from left to right.

Power was immediately reduced on 5801 in anticipation of the extreme turbulence to come. The right wing dropped slightly and returned to level flight position. A few seconds later the aircraft banked vertically to the right and the nose dropped about 45°. All controls were ineffective at this point. Complete control of the aircraft was regained at about 9000 ft. Possibly control could have been regained a few hundred feet sooner if it had been necessary. However, under the circumstances the main problem was to regain control of the aircraft without subjecting it to any undue stresses.

The incident was immediately reported to Vandalia radio and the identification of the other aircraft was determined from them. The Constellation reported the near miss to Lambert Tower at St. Louis.

The weather at the time was 5000 ft. scattered. Visibility below 5000 ft. was good but there was some haze. Visibility at 10,000 ft. was excellent. Many other aircraft had been observed on this flight, many at distances estimated at 20 mi. or more. Shortly before the above incident 5801C had changed course to the right to allow horizontal clearance between it and a TWA Martin 404 which was approaching head-on. This aircraft was seen a full 3 or 4 min. before it passed, which indicates that visibility was excellent at that altitude.

The Bonanza is a very difficult airplane to see when overtaking it due to its clean design. The Bonanza is a slow airplane by present standards, and was therefore overtaken very rapidly. However, had either the pilot or first officer of the Constellation been observing the area ahead of him, he certainly should have seen 5801C in time to take appropriate action.

On July 26, 1956, a report of this near miss was sent to the CAA on the appropriate form.

Lawrence C. Marshall, Pilot

Near Miss

At Baton Rouge on Dec. 4, 1956, pre-flight of Bonanza 759B began at 0855. Weather check for entire flight verified that VFR operations were possible, with ceilings around 4000 ft. in the Shreveport area and scattered in Tulsa area at 2100.

Clearance to Runway 13 was given by Ryan Tower (Baton Rouge) at approximately 0950. Run-up was completed and take-off began at 0955. During the take-off roll the Tower was heard giving instructions, "Your traffic is southwest—I mean southeast bound Bonanza on take-off."

Because no further contacts were heard by 759B, it was an indication that possible traffic was southeast of the airport. During the climb-out, and at an altitude of approximately 550 ft. above the surface, an Air Force T-33 was observed on the ILS Glide Path approaching head-on to 759B. A breakaway turn to the right by 759B provided adequate clearance. The T-33 was estimated to be around 700-800 ft. above the surface.

Contact with Ryan Tower as to the reason the T-33 was allowed to begin an approach against oncoming traffic revealed that "The Air Force aircraft was cleared to descend not lower than 1000 ft." Further contact with the T-33 was unsuccessful. This was requested by 759B to ascertain their intentions.

The weather at Ryan Field was thin scattered (high) and 15 mi. visibility, with light haze.

Remainder of the flight was uneventful. It would appear that T-33 misunderstood his clearance, and began his approach disregarding the altitude minimum as given by Ryan Tower.

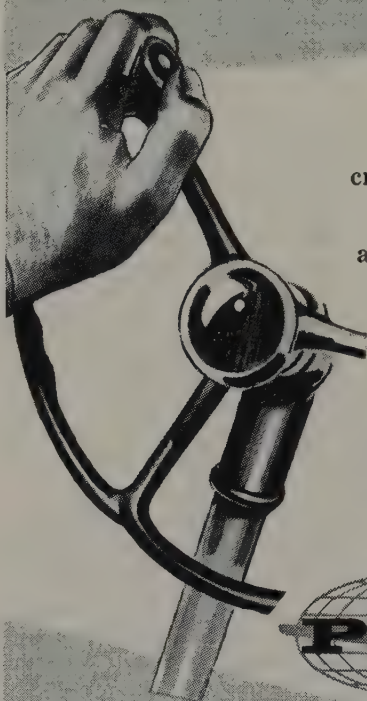
Donald E. Cox, Pilot.

CAB Wants Suggestions on Need For Landing Flares in Business Planes

The CAB Bureau of Safety Regulation has under consideration amendments to the landing flare requirements of Parts 40, 41, 42 and 43 of the Civil Air Regulations. Any person interested in these amendments, or who has suggestions to make in the preparation of new requirements, should submit data in duplicate to the CAB, Bureau of Safety Regulations, Washington 25, D.C., These communications must be received by CAB before Feb. 25, 1957; copies of such recommendations will be available after Feb. 27.

Study of flare requirements has been in progress for some time. Formal proposals were made to CAB at the Annual Airworthiness Review in 1955 for the elimination of present flare requirements. Statistics offered in support of the proposals cited incidents in which flares had been inadvertently dropped from air carrier planes while grounded or in flight. CAB accident investigation reports show 5 instances, from Jan. 1938 to date, in which flares were used in scheduled air carrier operations for emergency purposes, and that from 1947 to date no multi-engine

confidence man 1957



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plane has used flares for emergency purposes.

Recent tests conducted in an aircraft of less than 3500 lb. by the Univ. of Illinois show that a pilot needs thorough briefing and considerable practice before he can expect to land safely using a 1- or 1½-minute type flare. The value of 3-minute flares to modern transports, with their high speed and wide turns, is also questioned.

Flares are not required in military transports or in international air carriers, nor do CAR Draft Releases 55-24 (Air Taxi Certification and Operation Rules) and 56-2 (Scheduled Air Carrier Helicopter Certification and Operation Rules) require them. It has been recommended that a complete re-evaluation be made of flare requirements in Part 43 for non-air-carrier operations and in Part 42 for air taxi and large aircraft operations.

Sperry Award for All-Weather System

George F. Jude, Director of Flight Control Engineering at Sperry Gyroscope Co., has received the Lawrence B. Sperry Award, conferred by the Institute of the Aeronautical Sciences, for his contribution to automatic and all-weather flight. Jude led in developing an electronic system for the automatic control of jets.

NBAA Membership

Information regarding regular or Associate Membership in the NBAA is readily secured by writing to the Executive Director and Secretary at 344 Pennsylvania Bldg., Washington, D.C.

Membership in this non-profit and independent aviation organization is based on the recognition of flying problems common to all users of aircraft for business purposes and to those engaged in supporting the operation, servicing, equipment, and manufacture of business aircraft.

Among the fields in which NBAA is concerned are: improvements in airways and airports, better weather service, expansion in communications and air navigation facilities, higher standards of airport services, improved aircraft parts distribution, equitable tax rulings for business aircraft operations, greater recognition of the airplane as a necessary tool in modern business and industry, better air traffic control procedures, professional status for qualified business pilots, and aircraft designed to meet the special requirements of business flying.

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- Height: 5'8"-6'4" (without shoes).
- Age: 23-32 (Will consider men up to 35 if experience exceeds that listed below.)

Experience: Must have four years diversified aircraft and engine mechanic experience. One year of this experience must be on aircraft with engine rating of at least 800 H.P. In addition, must be able to secure the CAA A&E license.

Preference is given to applicant holding any one of the following additional experience:

1. Holders of current A&E licenses.
2. Have 100 or more certified hours as flight engineer.
3. Have CAA commercial pilot's license with 200 or more certified hours.

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■ Safe Flight Speed Control has been installed in two more corporation aircraft: The W. R. Grace Co., Ed McFee, Chief Pilot, has S-F Speed Control in their new Learstar; installation by Lear. Paul Holst, Chief Pilot for Michigan Tool, added Speed Control to their Lodestar and Beech D-18.

... in the business hangar

(Continued from page 29)

■ Executive Aircraft Service, Dallas, has completed 8000-hour overhaul and misc. installations on *The Flying Magnetometer* recently purchased by Aero Service Corp., Phila., from Gulf Research, Pittsburgh. □ LeCuno Oil Corp.'s Lodestar was returned to home base at Marshall, Tex., by pilots Gene Morscheck and Harold Gooden after engine change and misc. repairs by E-A. □ Dallas-based DC-3 of Union Chem. & Materials Corp. was brought to E-A by Charlie Bolton and Ray Warren for annual inspection and repairs. □ New interior, repainting and complete modernization was completed on the DC-3 operated by Delhi-Taylor Oil Corp., Dallas, Don Beeler, Chief Pilot. □ Executive Aircraft Service has finished installation of flush Jato, Sperry autopilot, radar and new interior, and 8000-hour overhaul on one of Esso Shipping Co.'s DC-3's. Phil Possiel, Flight Engineer, stood by while work was under way.

■ Roscoe Turner Aeronautical Corp. recently completed custom radio installation in the Super 18 Beech for Ken Jolly, av. manager of Texas-Gas Transmission. Included: Collins 17L4 transmitter, 51R3 omni and 51V2 glide slope receiver; ARC CD-1 course director system, T21 transmitter, 15D omni receiver with OBI and cross pointer, and isolation amplifier; Dare 360-channel transceiver; two Wilcox ADF's; and Flite-Tronics MB3 marker beacon receiver. □ Huber-Hunt-Nichols Twin Bonanza at Roscoe Turner for engine change. □ Sid Stone, Wayne Knitting Millis pilot, had the Super 18 Beech at R-T for engine change and compliance with Pratt & Whitney crankshaft bulletin. □ R-T is doing a lot of work on crankshafts, modifying to specs in CAA Directive 56-23-2. Orders from all over U.S. and Alaska. □ E. W. Tobey's G35 Bonanza was at Roscoe Turner for installation of Lear L-2 autopilot, Lear ADF-14 and LTRA-6.

■ Reading Aviation Service, Reading, back in operation after a strike, is doing extensive modification work as follows: □ New Holland Mach. Co.'s D-18 Beech, Reed Zimmerman, Pilot, is to get a Collins Communication System, comprising 17L4 transmitter and 51X1A receiver, and Wilcox lightweight ADF. □ Lukens Steel and Terminal Leasehold-Stewart Equipment Co.'s Aero Commander 680's are undergoing considerable modification. □ RAS is installing a Dare 90-channel communications system and Collins navigation system with maximum instrumentation in the Lukens 680, plus Collins Glideslope, two Type-21 ARC ADF's, an ARC 15D Omni, Wilcox 702 marker, FliteTronics DSA5A IsoAmplifier, Sperry C2A Gyro System and H6B horizon, new instrument panel with SAE grouping and lighting. □ Terminal Leasehold-Stewart Equipment Co. Aero Commander is being completely repainted. New equipment to be installed: Lear L-2 autopilot with automatic altitude controller, two 17L4 Collins VHF transmitters, Bendix RA-18C receiver, two Collins S1R3 navigation systems, Collins 51V2 glidepath receiver and 51Z1 marker beacon receiver, ARC Type-21 ADF, F-13A audio amplifier and CD-1 course director;

also custom instrument panel, with Grimes lighting, dual flight group, and a Jepsen Flight Disk. □ New 985 engine to be installed in Coal Sales Corp. Lockheed 12, Jesse Norris Pilot, and a new factory-reworked Continental E-185-9 engine in La Resista Corset Co.'s Navion, Bob Smith Pilot. □ Type-21 ARC ADF for Amphibious Charter's Widgeon, piloted by Dick Benson when John Foster Dulles vacations in Canada. □ Jonas Aircraft & Arms Co., N.Y., has arranged for RAS to install Narco VHF and Sun Air HF equipment in a new Piper Apache.

■ Timmins Aviation Ltd., Montreal installed Bendix X-band weather radar in Robertson-O'Connell's DC-3, first of its kind to be installed by a Canadian company in a business plane. □ Timmins announces new electronic and radio installation and servicing facilities. □ They also announce appointment as Maritime Province dealers for ARC and Collins.

■ Grand Central Aircraft, Glendale has two of Bahamas Helicopter's PBY-5A planes for modifications to include: removal of waist gun blisters for new cargo hatch; electric crane; relocation of cockpit controls; complete fire detection system; modernization of engines; 100-hr inspection. Chief Pilot is Frank Minjoy.

■ Qualitron, Inc., Burbank, has completed new radio installation in the DC-3 of Riss and Co., including Collins dual VHF communications and dual VHF navigation facilities with IFS. Warren Larson is chief pilot and NBAA rep. □ Al Junker and Bob Jeffrey brought Bethlehem Steel's Lodestar 51V for radio modifications including new edgelighted control panels. □ Murray Corp. of America DC-3 in for radar & radio maintenance & modifications of dual inverter system. E. C. Spencer pilot. □ Qualitron installed Dare DTR-360 VHF communications unit in a Bell helicopter for Northrop Aircraft. □ Signal Oil & Gas DC-3 modifications include addition of ARC ADF-21 radio compass and Dare DTR-360 VHF communications unit. Orlin Sorenson is Chief Pilot. □ Major modifications completed on one of Richfield Oil's Twin Beechcrafts: E-18 speed-up kit, new interior, repainting, ARC ADF-21 radio compass, inspection and maintenance of radio. □ Extensive radio modifications completed on P-38 and Twin Beech for Fairchild Aerial Surveys, Vernon Baird, Flight Manager.

■ AiResearch Div. of Garrett Corp. has made its initial installation of Jato units in a business plane, a converted B-25. Three 1000-lb. thrust units were mounted internally in a specially reinforced section of the fuselage aft of the bomb bay, which was retained for storage room. Exhaust extensions mounted flush, venting through special cover plate removable for replacing bottles after firing or for inspection. For flexible operation jets are triggered to be fired simultaneously or in sequence.

■ East Coast Tank Sealing, Miami, has Kollsman Instrument's Lodestar back in operation after complete resealing of fuel tanks. Al Zotack is Pilot.

now hear this...

(Continued from page 5)

David L. Steege was appointed Vice President and General Manager of Newark Air Service.

Robert J. Smith, Slick Airways President, was redesignated Chairman of Board of Directors of 11th Federal Res. Bank. **Alwin W. Johnson** was appointed Vice President and Director of Finance at Slick.

Ralph Matthews Jr., former Chief Pilot for Sawhill Tubular Prod., is new sales representative for AiResearch Div. of Garrett. He was recently cited by NBAA for 884,000 accident-free executive flying miles.

William T. Piper, President, Piper Aircraft Corp., received an award from ADMA at their 28th Meeting, Chicago.

Atlantic Aviation Service starts 1957 as Atlantic Aviation Corp., announces greater integration among branches.

Hycon Aerial Surveys opened new N.Y. offices directed by Dr. John Whittaker.

Paul V. Gavlin was elected Chairman of the Board, Motorola, Inc., and was succeeded as President by **Robert W. Galvin**, former Executive VP.

Philip M. Klauber, Chief Administrative Engineer, Solar Aircraft Co., was named Chairman of San Diego Section, ASME.

Leddy Greever and **Michael G. Neuberger** are new Vice Presidents at Beech.

Rodney W. King is new Executive Vice President of Riddle Airlines; **Peter T. Craven** is new Senior V-P and Treasurer.

Piasecki Aircraft Corp. has acquired the Aviation Division of Bellanca Corp. and its airport near New Castle, Del. The name of the airport has been changed from Bellanca Airport to Piasecki Airport.

Bendix Aviation Corp. has announced the acquisition of Sheffield Corp., Dayton, O., manufacturer of precision measuring instruments.

The Flying Tiger Line revenues for October were \$1,100,000, 40% above September and 25% above October 1955.

Narco has appointed Safeway Airways, Anchorage, Alaska, as regional distributor for aircraft radio and navigation equipment.

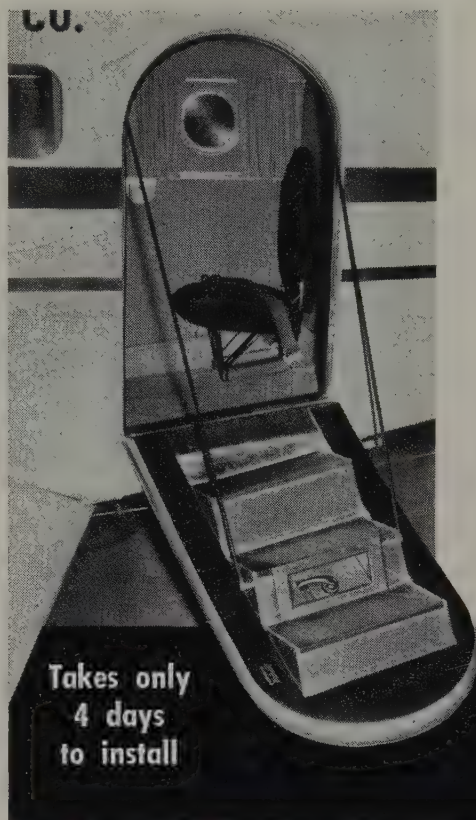
Addition to SKYWAYS Staff

Boyd B. Garrigan has been named West Coast Manager for SKYWAYS magazine. He will have his headquarters in Los Angeles.

Mr. Garrigan has spent the past eleven years in the advertising and sales fields, and was most recently associated with Erwin, Wasey Advertising Agency as Sales Promotion and Merchandising Manager.

While attending Santa Barbara State College, Mr. Garrigan earned his pilot's license. He is married, and has two children, Mike and Kathy. His hobbies include hunting, fishing, and photography.

Twin Beech owners: Add the safety and convenience of



STEP-DOOR CONVERSION

Improve and modernize your plane with a CAA approved step-door. Quicker, easier and safer to enter and leave your plane. Allows more room, eliminates space-taking swing-back door and auxiliary ladder. Leather upholstery to blend with plane interior. Folds up easily, shuts tightly. Heavy duty door lock, with separate safety catch. Kits available for field installation.

Write or call for more information

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Dayton Municipal Airport,
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CAA Gains in 1956

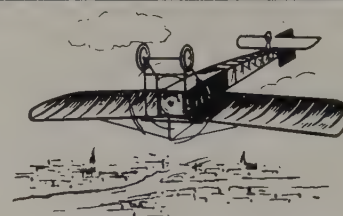
With air traffic at a record high, CAA closed 1956 with a radar-based air traffic control system near the hardware stage, and hundreds of new maintenance and control personnel in training. Work is progressing to prepare the airways system for the executive and airline jets on the way in the near future.

In 1956, for the first time, the number of applications for CAA approval of jet engines exceeded the number of piston engine projects, 21 to 18.

In business and general aviation, CAA inspectors issued an estimated 98,000 certificates to airmen and mechanics. In addition, they conducted a special campaign to improve the safety record of light twin-engine aircraft, aimed at teaching pilots proper emergency procedures in the new light twins.

CAA received \$75 million from Congress during the summer to start the 3-year airways modernization program, and by year's end more than \$30 million had been allocated for electronics equipment, including 23 long-range radar at a cost of \$9 million. Two other long-range radar were obtained from the military and placed in operation at New York and Norfolk. Goal is complete radar coverage of all airways.

The Federal Aid Airport Program had a list, in 1956, of projects for more than \$51 million for airport improvement. This sum was matched by a like sum from the airport sponsors, principally cities and counties, for improvements in approaches, runways, lighting, etc.



UPSIDE DOWN • 1913

The French pilot, Adolph Pegour, was first to fly upside down. This feat added little to the progress of aviation but it did demonstrate increased skill and daring in the handling of aircraft.

This same daring, later displayed by pilots experimenting with planes of untried design, did have a definite part in the development of the airplane we know today.

Another important contribution to aircraft development was the financial aid of "aviation insurance," which was made available to the industry upon organization of the United States Aircraft Insurance Group in 1928.

This same "U. S. Group" now grown to 64 leading companies still serves the aviation market with sound and dependable insurance for every aviation need.

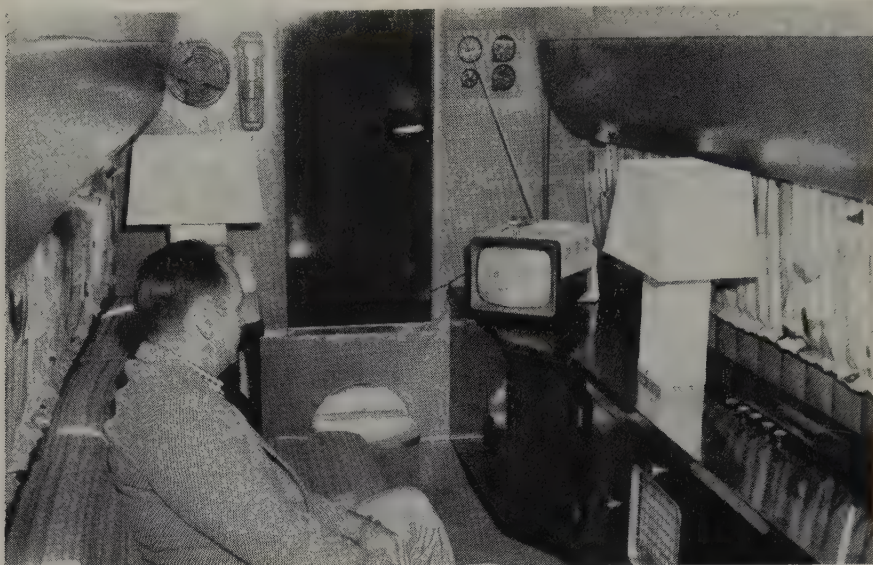
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General News



LIGHTWEIGHT portable television receivers are being installed by many firms in their executive transports. Shown here is a 10-inch Admiral set in the executive Lodestar operated by Kroehler Mfg. Co. The set weighs 16½ pounds, and is plugged into a 125-watt capacity ATR converter which is also used to operate a dictating machine, shaver, toaster and hi-fi radio. TV sound comes through four hi-fi speakers in the plane.

Portable Transistorized Radio Pager

Motorola, Inc., Chicago, announces that the new HANDIE-TALKIE low frequency Radio Paging system not only can individually alert and inform a paged person anywhere within a plant, hangar or adjacent airport area, but also does away with the sometimes ineffective loudspeaker which has to compete with high engine noise. Exceptionally valuable for contacting maintenance or pilot personnel in aircraft on ramp, or at fields where a radio link between office and aircraft is non-existent or may not be in use. The system consists of a selector console with individual buttons for key personnel, an FM transmitter that radiates alerting tones and voice messages within a confined induction loop area, and the individual, all-transistorized HANDIE-TALKIE radio receivers.

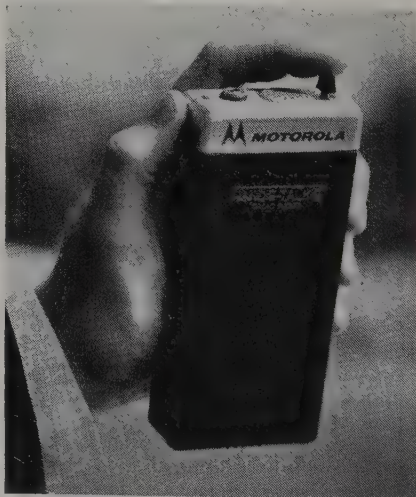
The headquarters operator presses the proper button to activate a particular pagee's receiver mechanism, then speaks into a desk microphone. No other receiver in the system hears either the alert or the voice message which follows.

The selective calling method utilized in the HANDIE-TALKIE Radio Paging system is identical in principle to the QUIK-CALL system which Motorola developed for individually alerting commercial or fleet aircraft in flight and vehicular 2-way radio fleets in motion. Basically, this method consists of matched precision vibrating reed mechanisms—one in each pocket receiver to correspond with another activated by the console selector button.

The receiver weighs only 10 ounces and measures only slightly larger than a pack of king size cigarettes. The unit can be clipped in a pocket or worn on a belt by the pagee. The 4 volt battery has

a life of 4 40-hour weeks. Unit operating cost is only 3 cents per 8 hours work day.

Up to several hundred persons per system can be paged individually, the additional channel capacity being added as needed. No FCC license is required for the system because it utilizes the inductive loop method of restricted signal radiation.



Lear Uses Electric Oven To Solder Assemblies

A method of soldering which uses radiant heat is being tested at the Grand Rapids Div. of Lear, Inc.

Heart of the system is an oven, lined with gold plate to reflect the heat of eight 1600-watt bulbs, each capable of producing radiant heat up to 1000° F.

A conveyor belt fitted with aluminum jigs passes through the oven. The operator places assemblies on the jigs and adds a pre-formed ring of solder.

The oven can be regulated to produce the right amount of heat for a firm solder. The conveyor belt can pass assemblies through the oven at a rate between two and four per minute. There is a preformed ring of solder to fit every job done on the conveyor.

Tom Marra and Harry Dice worked in conjunction with Fostoria Pressed Steel Products to develop the system for Lear.

Further Expansion of Aero Design Facilities in Oklahoma City

Aero Design & Engineering Co., manufacturers of the Aero Commander 560A and 680 Super executive planes, has announced details of a new expansion of their Oklahoma City facilities.

Construction of a new \$1.5 million, 126,000 sq. ft. factory has begun on a 44-acre site south of Tulakes Airport, Bethany, Okla. When completed in Aug. 1957, airframe construction activities will be moved from the old plant.

George T. Pew, Chairman of the Board of Aero Design, characterized this as the first phase of a long-range development program. When the first phase is complete it will accommodate about 2000 employees on a 1-shift basis. Production potential will then be twice the present figure, permitting Aero to build in a year as many planes as it has built to date.

Cessna 1956 Sales Top \$66 Million

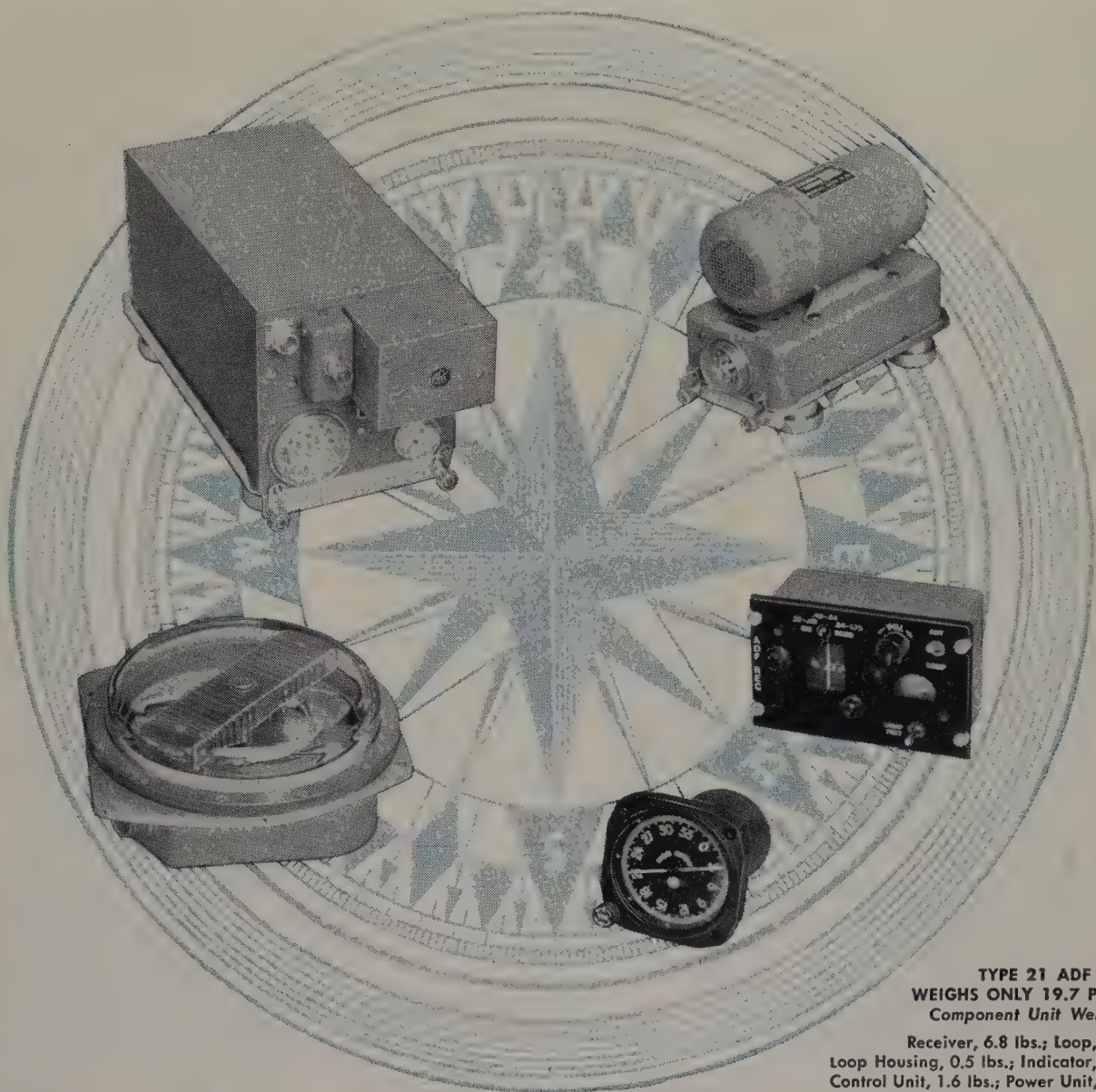
Based largely on the popularity of the Models 172 and 182, and increasing demand for the twin-engine Model 310, Cessna Aircraft Co. reports a 92% increase in units delivered during 1956, and a 75% increase in dollar volume. A total of 3045 units, valued at \$66,266,927, were sold in 1956, a 33% increase over the 1955 fiscal year.

Company president Dwane L. Wallace said that Cessna's growth was part of an industry-wide development. The business aircraft industry increased by 55% in unit sales during 1956; Cessna sales represent 47% of this increased figure, leading the way with the 172 and 182, most popular in each price class of single-engine 4-place planes.

In commenting on a 64% growth in sales of the twin-engine 310, Wallace said, "Acceptance of the light twins by American business over the past 3 years has been phenomenal.

Cessna facilities expanded in 1956, \$1,810,000 being spent for manufacturing equipment, engineering, testing and office equipment, and an added 69,000 sq. ft. of floor space. Over \$5 million is earmarked for additional plant facilities in 1957.

An increased volume of Cessna Military sales is also anticipated for 1957. Production of the T-37A twin-jet trainer is being accelerated; the new Wallace plant is ahead of schedule, and the current contract status of the T-37A exceeds \$48 million.



TYPE 21 ADF
WEIGHS ONLY 19.7 POUNDS
Component Unit Weights:

Receiver, 6.8 lbs.; Loop, 4.3 lbs.,
Loop Housing, 0.5 lbs.; Indicator, 1.3 lbs.;
Control Unit, 1.6 lbs.; Power Unit, 5.2 lbs.;
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NEW LOOK in navigation aids

The Time Tested ADF Now In Less Weight, Less Space

The ADF is a basic air navigation instrument, used in all parts of the world, tunable to some 60,000 transmitters. But the important thing now about the ADF is that ARC has engineered an ADF system down to less than 20 pounds in weight, with a comparable saving in space.

Now pilots enjoy the advantages of dual installations of this compact miniaturized equipment in tolerable weight and space requirements.

The ARC Type 21 ADF is built to today's more critical speed and environmental demands. It has hermetic sealing of vital components, such as the entire loop assembly. It covers all frequencies from 190 kc to 1750 kc . . . operates on only 2.8 amps at 27.5 volts dc input. A significant feature is the extremely low loop drag — only two inches below the aircraft skin.

Ask your dealer for detailed literature.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, NEW JERSEY

Miniaturized Automatic Direction Finders

Omni/Loc. Receivers • Course Directors • UHF and VHF Receivers and Transmitters • LF Receivers
and Loop Direction Finders • 10-Channel Isolation Amplifiers • 8-Watt Audio Amplifiers • Interphone Amplifiers
Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators



AIR LINE PILOTS

Eastern Air Lines' \$422,-000,000 expansion program including turbo-prop and straight jets requires additional pilots.

Eastern Air Lines offers you—

Security for yourself and family

Opportunity for advancement

Excellent pay

Broad insurance coverage

Many other excellent employee benefits

To qualify for consideration—

U. S. citizen

High school graduate

Age 21-30 (Will consider men up to age 32 if have 1500 hours or more)

5'8" to 6'4" in height

20/20 vision without use of glasses or contact lens

At least 400 hours certified time

Must have CAA Commercial License—prefer current instrument rating

For current and future openings, write immediately detailing personal qualifications, work experience and flight time to:

Capt. F. B. Kern,

Chief of Pilot Training

Eastern Air Lines

Box 787, Miami 48, Florida

How High to Fly?

(Continued from page 19)

than the temperature difference increases due to the lower ambient air temperature at altitude.

The effects of altitude on the powerplant are primarily a reduction in thrust with altitude, certain functional problems related to the low temperatures and the usual cooling difficulties always associated with heat power machinery. Figure 11 shows the thrust from a typical jet engine plotted against altitude. Curves for 200 mph and 500 mph are drawn to show the small change in thrust with forward speed. Figure 12 shows the fuel consumption plotted against altitude. The specific fuel consumption is practically independent of altitude but the total fuel flow decreases as the thrust does.

The amount of fuel carried in a modern jet transport may be as much as one-half

of its take-off weight. To pump such large quantities of fuel requires pumps, lines, valves, and fittings much larger than have been used in the past. The fuel may be cooled to a very low temperature due to the high altitude. This often results in the formation of a large quantity of ice in the system as the water is forced out of solution. Protection from this ice by filters and a fuel heating system becomes imperative.

Cooling problems are always aggravated by altitude. In a jet-engine installation the principal cooling requirement is to cool the oil. Since fuel heating is required, it is quite natural to use the fuel to cool the oil or use the oil to heat the fuel depending on the point of view. In transport-type installations it appears practical to do this without any additional air cooling.

Low temperatures associated with altitude introduce problems with organic materials such as rubber and various seals. New and improved types are constantly being developed.

The principal items of performance and economy affected by extremes of altitude are speed, range and operating cost. For the same take-off distance jet-engine airplanes have much greater power installed. This is the principal reason that such airplanes are much faster and fly much higher. Figure 13 shows the thrust as a fraction of the weight for both types of airplanes

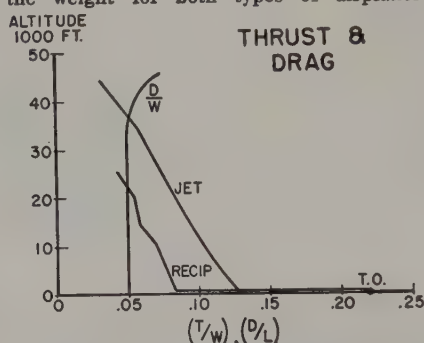


FIG. 13

plotted as a function of altitude. Also plotted is the drag of a typical airplane at its best operating speed. The thing of interest is that these curves cross at about 25,000 ft. for the reciprocating engine and about 37,000 ft. for the jet, and that there is a much greater margin of thrust for the jet airplane at all altitudes.

Speed altitude characteristics are shown in Figure 14. There are three speeds shown. The maximum speed, the speed for maximum-range operation, and a structural limiting speed. The structural limiting speed is a designer's choice and is used to restrict the loads that the airplane must be designed to withstand. The maximum speed is practically independent of altitude; however, the speed advantage of higher altitudes in both the maximum-range and structural limit cases are clearly shown.

The effect of altitude on range is shown in Figure 15. Two cases are plotted: one for maximum-range operation and one for maximum-speed operation. At the limiting altitude these curves coincide and define the point where the maximum range can be accomplished at the maximum operating speed. Reducing the altitude decreases the maximum range until at sea level only half the possible range can be made good. However, the shape of the curve is such that the altitude can be reduced about 10,000

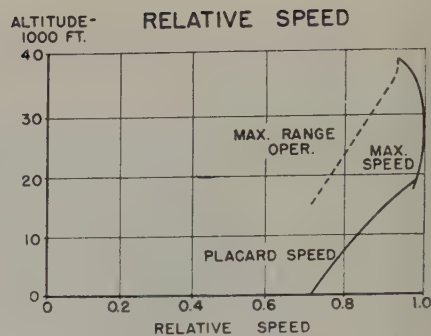


FIG. 14

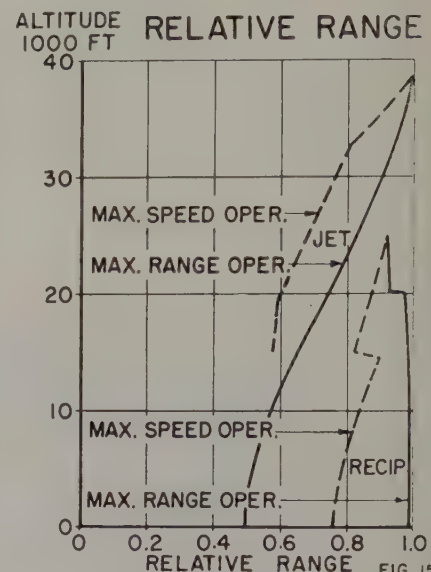


FIG. 15

ft. at a cost of 10 per cent of the range.

If a jet airplane is operated within its range limitations, it can be operated at any altitude without appreciable effect on its block speed or economy. Figure 16 shows the direct cost in cents per 200-lb-mile as a function of altitude. The cost increases slowly down to 20,000 ft. then increases more rapidly due to the structural limiting speed. The structural speed limitations could be eliminated by designing for a greater speed at lower altitudes, but would result in a considerable increase in the structural weight. A compromise based on operating conditions is usually made.

● This paper was presented by Mr. Kleinhans at the Los Angeles meeting of The Society of Automotive Engineering. It is reprinted here through the courtesy of SAE.

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OPERATING COST

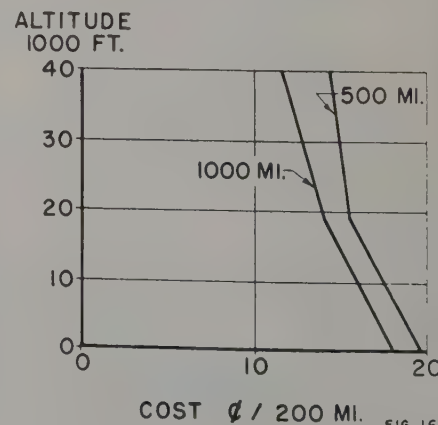
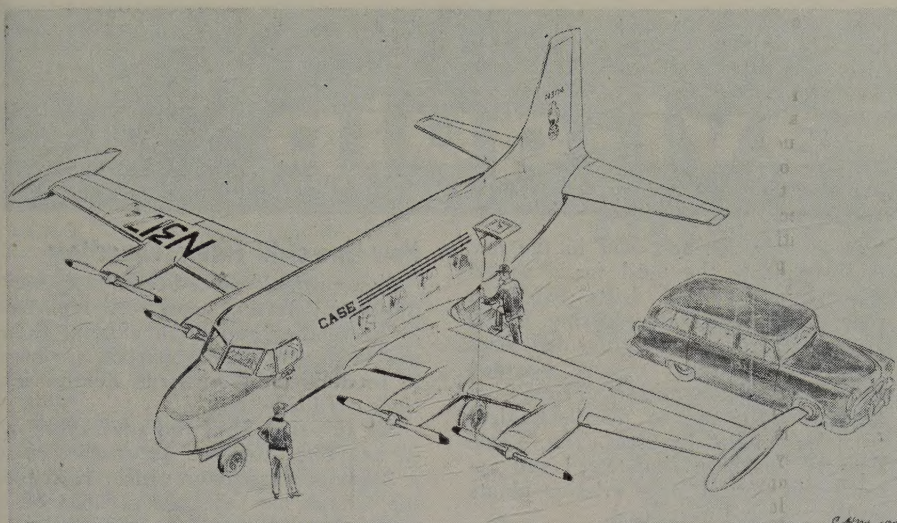


FIG. 16



One Man's VISION 1948 vs. 1956

You may be interested in seeing how closely America's newest executive plane comes to the "ideal business aircraft" envisioned in 1948 by a veteran pilot who knew what was needed.

Mr. Dwane L. Wallace, President
Cessna Aircraft Company
Wichita 1, Kansas

October 11, 1956

Dear Dwane:

Between 1948 and 1954 I was quite active in trying to interest the aviation industry in building airplanes specifically designed and suited for business flying operations. In 1950 I made a sketch of an airplane which I felt incorporated many of the desirable features required in a business airplane. A photograph of the original drawing is enclosed for your information. May I call your attention to the similarity to your Model 620.

The proposed airplane was for eight passengers and a crew of two, pressurized, and with a minimum head room of 74 inches. Some of the specifications which are interestingly close to the 620 are as follows:

Wing Span	55 feet	Taper Ratio	.4
Length	46 feet	Thickness Ratio	.16
Wing Loading	42.5 psi	Gross Weight	16,000 lbs.
Aspect Ratio	8	Fuel	415 gallons (All fuel located at tip tanks and outer wing panel)

At that time, the only engines which were listed by the manufacturers as possibly meeting requirements were the Lycoming GSO-785. The estimated performance of the airplane, using these engines and at 60% power, was:

267 mph	at 10,000 feet
274 mph	at 15,000 feet

It is very gratifying and a source of personal satisfaction that Cessna should have finally produced an airplane so similar to that which I was proposing as far back as 1948 as an "ideal executive airplane." I can also tell you that I was literally laughed at in many circles not only for claiming that there was a market for such an airplane but that business flying had any real future.

I thought you might be interested in the similarity of the two airplanes, inasmuch as I don't believe you had any previous knowledge of the drawing and specifications which I made up in 1950.

Yours very truly,

J. I. CASE COMPANY

(signed) Cole H. Morrow

Director of Plant Engineering

N.B.A.A. Director's Notes

(Continued from page 8)

Newly appointed CAA Administrator Jim Pyle took time out immediately following swearing-in ceremonies to thank NBAA personally for its "fine cooperation" with CAA in the many aspects and problems of Business Flying.

Pyle, experienced and active commercial pilot, is expected to continue vigorous airways aids campaign. 28 surveillance radars ordered for operation this year—more to come if Congressional CAA appropriations receive your active support. How long since you wrote your Congressman?

* * * * *

Recent AD 56-23-2 on R-985 engines amended at NBAA request; new AD 56-26-3 changes overhaul time to more

reasonable 100-hour interval. NBAA specifically demanded that report of inspection be made to CAA Power Plant Branch by person or repair station making the inspection. "This information is necessary to determine the continued need for the inspection required," the new AD 56-26-3 states.

* * * * *

Washington's Wright Day Dinner—top echelon aviation awards dinner—honored everyone but the ones who make flying what it is today, the great mass of civil aircraft owners, civilian pilots, and the tax-payers who foot the bills.

The dinner can be classed as a VFR affair—see and be seen—black bow ties and all. —Bill

nu-avi-quip

Self-Sealing Hydraulic Couplings

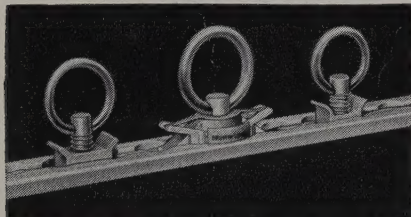
A new self-sealing aircraft coupling, designated Series 3200, has been designed by the Aeroquip Corp. for use on airframe and aircraft engine hydraulic systems with temperatures up to 275° F. and maximum pressures of 300 psi. The coupling was designed to meet the requirements of Proposed Military Specification MIL-C-25427.

Functionally the coupling takes the place of two shutoff valves and is particularly suited for installations where a hydraulic line must be broken for maintenance or test operations, and for the connection of such accessories as pumps, accumulators and actuators. It may be quickly connected and disconnected, and a fast visual or touch inspection determines whether it is connected and locked. Connection is made by a manual one-quarter turn of the union nut; disconnection is accomplished by an axial pull on the nut.

Aeroquip Bulletin 14 contains complete data on Series 3200 couplings.

Cargo Tie Down Fittings

A completely new line of cargo tie down fittings for aircraft has been designed by the Brown-Line Corp. of El Segundo, California, to anchor to aircraft standard floor seat track, in keeping with the trend of convertible pas-

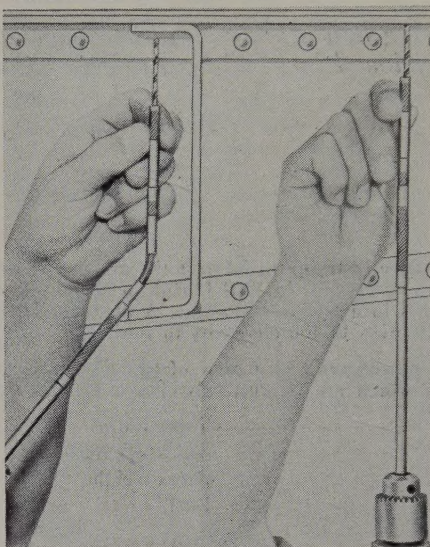


senger-cargo aircraft. This new line of tie down fittings permits cargo loadings in aircraft originally built for passengers, or in sections of aircraft along with passengers, giving greater airline-aircraft flexibility. Made in three styles with acceptable load ratings of 2000 pounds to 6000 pounds per fitting. Manufactured under patent license from Pan American World Airways.

New Drill Extension Provides Flexible Or Rigid Tool In One Drill

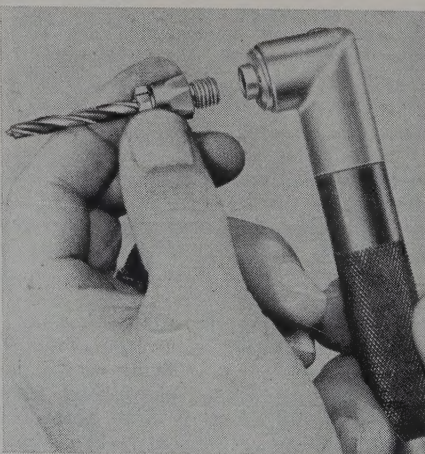
A new two-in-one drilling tool is announced by the Beaver Tool Company, N. Y. The "Little Beaver" Drill Extension, #600 series, offers a unique design which converts the flexible drill extension to a rigid drill extension at the flick of a finger, without shutting off the power. A change-over from rigid to flexible is equally rapid simply by sliding the locking sleeve to either position. The "Little Beaver" adds 10 or more inches to standard length drills, assem-

bles in only seconds, and in the one tool supplants the need for a varied inventory of special drills, extension rods, and brazing and soldering. It can accommodate over 52 regular drill sizes with corresponding, clearly stamped chucks available in numerical sizes from #52 to #10, and in fractional sizes from $\frac{1}{16}$ " to $\frac{3}{16}$ " by 64ths. The "Little Beaver" has been shop-tested and approved in several large aviation plants on the east and west coast.



The Beaver Tool Company also announces a new drill chuck which is claimed to produce a firmer grip on drills than the usual drill chuck used with angle head or snake drills.

The Beaver Mini-Chuck has a specially designed cut-back slot which permits a full tension grip of the drill to prevent slippage and pull-outs. The tool's flexibility and efficiency save time and reduce costs principally because the only replacement required is the drill itself. Mini-Chuck is available in a full range of chuck sizes from #50 to "F" with adapters to fit spindles of standard angle head and snake drills.



New Line of RF Filters, Capacitors

New custom designed radio-frequency filters and starting capacitors, reported to be smaller and more efficient than any at present on the market, are now in production by Airborne Accessories Corp., Hillside, N.J.

As an example of the advantages of its new line, Airborne Accessories cites a $2\frac{1}{2}$ -ounce capacitor which, at triple the voltage, has twice the capacity of a conventional 10-ounce capacitor.

The new units are designed to meet the following specifications: JAN-C-25, MIL-I-61-81-B, and MIL-M-8609. Vacuum impregnated with polyamide resin and hermetically sealed in steel cans, the filters and capacitors are reported to have excellent resistance to vibration, fungus, salt spray and humidity. They retain their properties from -65° to 300° F.

Multi-Breakout Harness Features Complete Circuit Hookup in Unit

Designed as an inter-connector between ground test equipment and airborne equipment for pre-flight check-out, a multi-breakout harness assembly produced by Pacific Automation Products offers simplicity and durability for commercial operations.

The new cable provides a complete complex circuit hookup in one assembly, and its configuration is designed to fit an exact installation requirement.

The neoprene-jacketed unit is watertight, fungus proof, rodent proof, and is not affected by short exposure to oils, acids, alcohols, ozone and water, and long exposure to sunlight. Connectors are sealed against moisture and dirt.

New Camera Mount Lock Facilitates Aerial Photography

A quick-disconnect mounting for aircraft cameras and instruments which eliminates the possibility of any movement in any direction, and which permits returning a camera, after removal, to the same position in which it was previously mounted, is offered by Huber Industries as *Duplex Vee-Lock*.

Self-centering and self-leveling, stability is achieved in the Vee-Lock by designing the side rails of the receptacle and the unclamped edges of the dovetail plate at matching 45° angles. The receptacle and dove-tail plate are locked securely with a single screw, although the locking force is evenly distributed through the components of the mount.

The Vee-Lock may also be used to hold telescopes, telescopic cameras and motion picture cameras. Conversion kits are available for all previous models of Huber camera mounts.

Versatile Miniature Indicator Gives Two Readings in Minimum Space

A new electrical indicating instrument developed for aircraft use features a dual display in a case only $1\frac{3}{8}$ " in diameter by 2" long. Originally designed to indicate trim position and provide "Off" alarm for fail-safe circuit, by means of a pointer and a flag, the new indicator has application wherever two functions must be clearly displayed in minimum space, in an environment of high shock and vibration. Mounting is accomplished by AN5808 type clamps.

A coaxial mechanism (Marion MEP-2D) was used to fit this two-element instrument into a small case. The indicator meets MIL-E-5272A Procedure I requirements for vibration and shock, and features a true glass-to-metal hermetic seal.

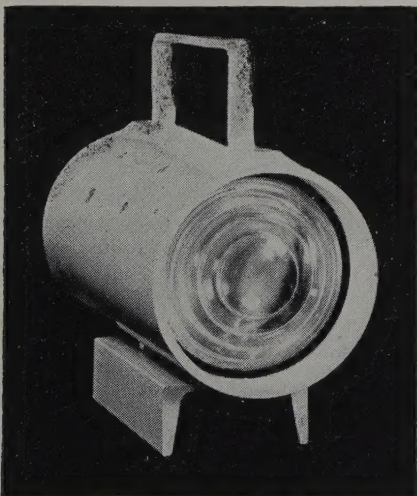
Other specifications of the Marion HCM $1\frac{1}{4}$ instrument: available in all ranges normal to DC moving coil instruments; operating temperature range of -55° to $85^{\circ}\text{C}.$; weight 4 ounces; standard AN connector.

Airport Marker Uses No Electricity

Offering no-maintenance operation for as much as 10 years, a unique illuminated marker is now available which uses a radioactive gas and phosphorescent crystals to produce light.

The signals and markers, designed for installations where power and maintenance are limited, are available in a variety of shapes, sizes and brightness to suit any specifications, and are suitable for airports and marine and industrial applications.

Called the "Isolamp," the unit operates by exposure of phosphor to a radioactive gas, Krypton 85. The manufacturer has long experience in the industrial use of radioactive elements, and reports no radiation hazard. The power source is enclosed in weather-proof, tamper-proof capsules, and eliminates the need for external power, transformers, batteries or bulbs.



TEN YEARS without maintenance, electricity, batteries or bulbs is reported possible with "Isolamp," an airport marker which operates on radioactive gas and phosphor.

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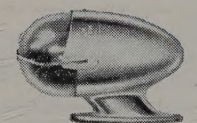
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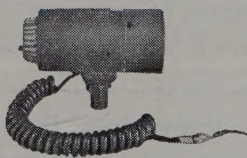
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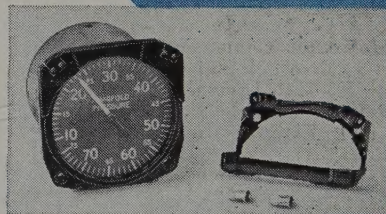
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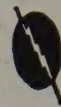
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